Secondary Prevention of Psychological Maladjustment in Pre-school and School-age Children after an Unintentional Injury

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ABSTRACT

Accidental injuries are frequent among children of all ages. Besides the potential for physical impairment, accidental injuries lead to a considerable number of children suffering from posttraumatic stress disorder (PTSD). For children at risk for the development of PTSD, early psychological help is crucial. The aim of this thesis was to create and evaluate an early intervention based upon empirically-based knowledge drawn from previously conducted studies.

To gain an overview of the current state of the art, a meta-analysis of studies was conducted on the characteristics and efficacy of early psychological interventions in children after a single traumatic event. Seven studies involving children ages 7-18 years were included (including four randomized controlled trials). Results identified dissociation and anxiety as the symptoms experiencing the largest and most statistically significant intervention effects. For other outcome variables (e.g., PTSD symptoms, behavior problems, and depression symptoms), beneficial but small overall effects were observed. These observed effects are nonetheless remarkable, considering the brevity of the early interventions. The conclusion of this meta-analysis was that early interventions are helpful for school-age children after a single traumatic event. Moreover, these interventions should include psycho-education; potentially some form of trauma reconstruction; and training in individual coping-skills. Parental involvement, offering more than one session, and a stepped-care model also might enhance an intervention's efficacy.

Based upon the findings of this meta-analysis and the results of a previous study conducted within our department, a two-session *E*arly *P*sychological *I*ntervention for *C*hildren *a*nd *P*arents (EPICAP) was developed and manualized separately for children ages 2-6, 7-11, and 12-16 years. This intervention included psycho-education, age-appropriate trauma reconstruction, and individual coping-skills training.

The study design followed a step-wise, risk-based protocol, for which risk-screening instruments were required. To date, no instrument had been formally evaluated for young children immediately after a single traumatic event. Therefore, the screening questionnaire for pre-school children used in the present study was evaluated. This screener consisted of an adapted version of the Pediatric Emotional Distress Scale, the PEDS-ES (PEDS-Early Screener), as well as questions on five additional risk factors. The *PTSD Semi-structured Interview and Observational Record for Infants and Young Children* (PTSDSSI) was used as a criterion measure six months post-accident. Surprisingly, the PEDS-ES performed best when used alone, displaying high sensitivity (85%) and moderate specificity (63%). With the PEDS-ES, for the first time professionals and parents both have a valid questionnaire on hand

to estimate a young child's risk of developing full or partial PTSD immediately after a single traumatic event. We suggest that the PEDS-ES is used within a stepped-care model.

Finally, the EPICAP intervention was tested empirically by means of a prospective, randomized, controlled trial (RCT) involving 51 pre-school and 57 school-age children screened at high risk for the development of PTSD after a road traffic accident or burn. Children in the control group received standard medical care, while children in the intervention group also received the age-adjusted EPICAP intervention. All children were assessed at baseline and at three and six months of follow-up. Primary outcomes were the child's PTSD symptoms and diagnosis. Secondary outcomes were the child's behavior problems (children ages 2-16 years) and depression symptoms (children ages 7-16 years).

We found that the EPICAP intervention was not effective for pre-school children with regards to the outcome variables. In addition, the vast majority of parents of young children was satisfied with the intervention (68.8%) and did not feel distressed during sessions (96.4%). Hence, because there is value in reducing any additional parental stress in the acute phase of a traumatic event, the EPICAP intervention might still be helpful for pre-school children, even in the absence of any evidence-based interventions in this age-group. Further studies on early interventions in these understudied young children are desperately needed, some of which should focus on the short-term impact of early interventions in parents and children, as well as on parent-child relationships and parental distress.

As opposed to pre-schoolers, school-age children who received the EPICAP intervention experienced fewer intrusive PTSD symptoms and internalizing problems than controls three months post-accident. This suggests that the EPICAP intervention is to some extent effective for older children at risk for PTSB after an unintentional injury. Because of the small sample sizes and the results being confined to only a few outcome variables, these encouraging results must be considered tentative. Further larger RCTs on early psychological interventions in school-age children are still warranted. Future research might also focus on the subjective needs of families immediately after a single traumatic event.

To summarize, by reviewing the current literature, this thesis has shed light on the characteristics and efficacy of early psychological interventions in school-age children after a single traumatic event. Our research findings contribute important insights into the still fragmentary body of evidence on early interventions in school-age children. For pre-school children, the tested intervention was ineffective at reducing psychological problems. Nevertheless, parents were contented with this form of early assistance. Finally, for the first time, an early screening instrument has successfully been evaluated to estimate a pre-school child's risk of developing PTSD following a single traumatic event.

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1 General Introduction

1.1 Trauma

1.1.1 Definition of Mental Traumatization

The *Diagnostic and Statistical Manual of Mental Disorders (text revision) DSM-IV-TR (American Psychiatric Association, 2000)* defines a *traumatic event* as an "event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others" (American Psychiatric Association, 2000; p. 467). *Psychotraumatology*, consequently, is the discipline which addresses the development, assessment, course and treatment of mental traumata (Landolt, 2012).

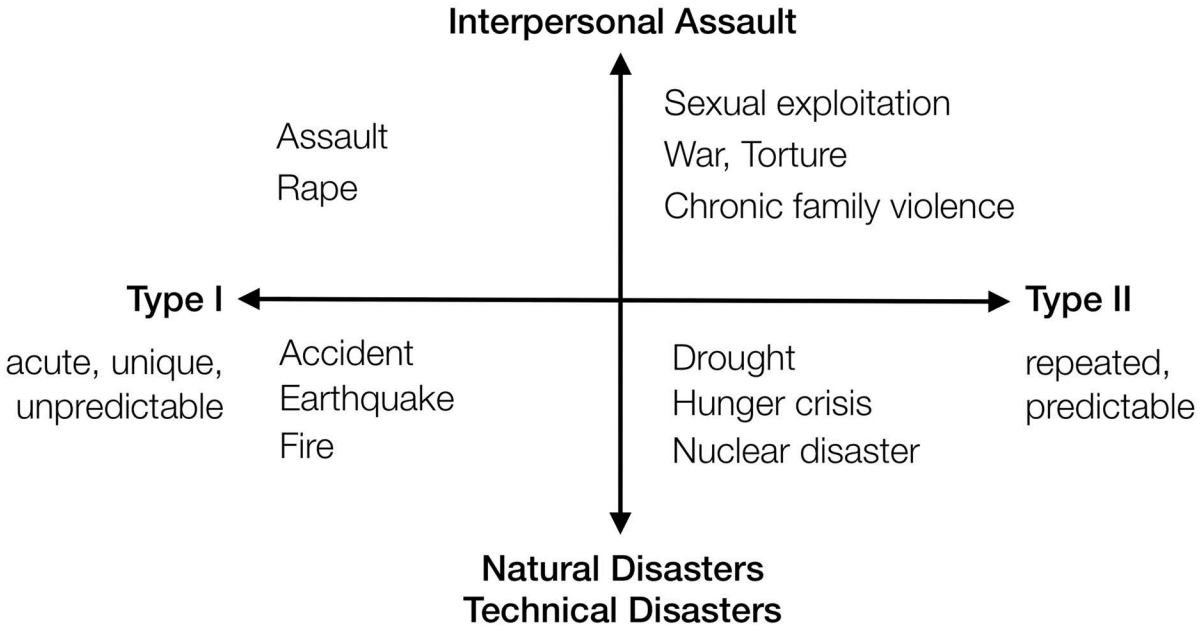

Figure 1.
Dimensions of traumatization (Landolt, 2012, p. 17; translated by the author)

Mental traumatization can be classified by means of two dimensions. One dimension represents the frequency in which a given traumatic event occurs (Terr, 1991). A single, acute and unpredictable traumatic event, like a road traffic accident or burn, is classified as *type I traumatization*, whereas a repeated and, at least to some extent, foreseeable traumatic event like sexual abuse is called *type II traumatization*. The other dimension represents the cause of trauma (Landolt (2012); see Figure 1). One can distinguish between deliberate and man-made events like interpersonal assaults, and accidental events like natural or technical disasters, examples of which would be earthquakes and nuclear catastrophes, respectively (Landolt, 2012).

1.1.2 Epidemiology of Traumatic Events

1.1.2.1 Prevalence of various Traumatic Events

With between 14 and 87% (Alisic, van der Schoot, van Ginkel, & Kleber, 2008; Elklit, 2002; Essau, Conradt, & Petermann, 1999; Perkonigg et al., 2005) of children and adolescents becoming trauma victims in Europe, and between two fifths and two thirds similarly being victimized in the USA (Copeland, Keller, Angold, & Costello, 2007; Giaconia et al., 1995), it is clear that traumatizing events are a frequent occurrence. The most frequent types of traumatizing events tend to be physical threats or attacks, serious injuries/accidents, and the (sudden) death of a loved one (Alisic et al., 2008; Elklit, 2002; Essau et al., 1999). In Switzerland, in a recent population-based study among 9th graders (97% of the sample between 14.0 and 16.9 years old), 56% of the adolescents reported having experienced at least one serious traumatic event (Landolt, Schnyder, Maier, Schoenbucher, & Mohler-Kuo, 2013). Moreover, almost 35% reported having experienced more than one major traumatic event. The two most often reported potentially traumatic events were hearing about the violent death/injury of a loved one (22.4%; 25.6% in girls and 19.4% in boys), and witnessing someone being injured/threatened with severe bodily injury (19.3%; 15.8% in girls and 22.6% in boys). Notably, there were significant sex differences in the frequency of all types of traumatic events (except for painful and scary medical treatment when severely ill or injured; Landolt et al., 2013).

Discrepancies between studies regarding the prevalence of emotionally traumatic experiences and posttraumatic stress disorder (PTSD) might at least partly be due to methodological differences, like the type of assessment tool(s) used (e.g., self-report vs. in-person interviews), sampling methods, and sample sizes, and cultural differences. For instance, Elklit (2002) studied a list of traumata that included events that did not meet DSM-IV-TR *(American Psychiatric Association, 2000)* criteria (e.g. divorce of parents and mobbing; Landolt et al., 2013).

1.1.2.2 Prevalence of Road Traffic Accidents and Burns

Given that the present thesis focuses on road traffic accidents and burns, in the following paragraphs, the epidemiology of these specific traumatizing events is highlighted.

In 2006, roughly 34% and 54 % of all European road traffic accidents and burns affected children younger than 19 years of age, respectively. Considering just road traffic accidents and burns in childhood, 85% of the former occurred in school-age children, while 62% of the latter occurred in pre-schoolers (Injury Database (IDB) of the European Commission, 2008).

A recent systematic literature review of European epidemiologic studies revealed that 40% to 50% of hospitalized patients with a severe burn injury were children, and children younger than 5 years accounted for 50% to 80% of all childhood burns (Brusselaers, Monstrey, Vogelaers, Hoste, & Blot, 2010).

Table 1.
2010 police report of road traffic accidents involving some injury to at least one person (slight to severe injury with nonfatal consequences) in Switzerland (bfs – Bundesamt für Statistik, 2011)

				comparison with total population		comparison within childhood		
Switzerland	Age	N Community members	N road traffic accidents	per 100'000 total population (non-accidents)	% of road traffic accidents in total population	per 100'000 children (non-accidents)	% of road traffic accidents in total childhood	% of road traffic accidents in same age category
Pre-school children	0 to 5	470'349	306	4	1.26%	21	10.12%	0.07%
School-age children	6 to 17	989'467	2'717	34	11.21%	186	89.88%	0.27%
Childhood	0 to 17	1'459'816	3'023	38	12.47%	207	-	0.21%
Total population	0 to 70+	7'940'969	24'237	305	-	-	-	-

In Switzerland, the prevalence rates for non-fatal road traffic accidents and burns in children are considerably lower than the European Union average. In 2010, the Swiss police reported 38 childhood road traffic accidents per 100'000 inhabitants (Table 1). Meanwhile, only 4 children per 100'000 were hospitalized because of a burn (bfs – Bundesamt für Statistik, 2011). Notably, the Swiss statistics for burn accidents only consider inpatient treatments. Therefore, the effective number of non-fatal burn accidents might be considerably higher.

Table 2.
Inpatient treatment for burn injuries (without semi-inpatient and outpatient treatment) in 2010 in Switzerland (bfs – Bundesamt für Statistik, 2011)

				comparison with total population		comparison within childhood		
Switzerland	Age	N Community members	N burn accidents	per 100'000 total population (non-accidents)	% of burn accidents in total population	per 100'000 children (non-accidents)	% of burn accidents in childhood	% of burn accidents in same age category
Pre-school children	0 to 5	470'349	-	-	-	-	-	-
School-age children	6 to 17	989'467	-	-	-	-	-	-
Childhood	0 to 17	1'459'816	350	4	36.96%	24	-	0.02%
Total population	0 to 70+	7'940'969	947	12	-	-	-	-

Even though the prevalence of road traffic accidents and burns differs statistically, the proportion within given age-groups and types of accident remains comparable: approximately 12 to 34% of all road traffic accidents and 37 to 54% of all burn injuries happen in children.

1.2 Potential Consequences of a Traumatic Experience

1.2.1 Classification

1.2.1.1 Overview

Any traumatic event usually leads to immediate stress reactions, which occur within the first minutes and hours after the event. The classification of *Acute Stress Reaction* in the 10th revision of the *International Statistical Classification of Diseases and Related Health Problems* (ICD-10 F43.0, Dilling, Mombour, & Schmidt, 1991) takes these initial reactions into account. The corresponding symptoms of constriction of consciousness, disorientation, and narrowing of attention, which typically are followed by or alternate with withdrawal or agitation and over-activity, mostly disappear within hours or days. When these symptoms persist, other diagnostic possibilities must be considered. Among these possibilities, the DSM-IV-TR *(American Psychiatric Association, 2000)* lists *Acute Stress Disorder* (308.3), which occurs within 2 days of the event and lasts no longer than 4 weeks. However, if symptoms exceed 4 weeks, a diagnosis of the *posttraumatic stress disorder* might be indicated (309.81). The *Adjustment Disorders* described in the DSM-IV-TR *(American Psychiatric Association, 2000)* account for symptoms like anxiety, depressed mood, and conduct disturbances that occur in relation to any demanding life situation (Table 3). People who have multiple traumatic experiences also might develop a profound *personality disorder* (Landolt, 2012).

Table 3.
DSM-IV-TR (American Psychiatric Association, 2000) diagnostic categories for the Adjustment Disorders

DSM-IV-TR Code	Disorder
309.0	Adjustment Disorder with Depressed Mood
309.24	Adjustment Disorder with Anxiety
309.28	Adjustment Disorder with Mixed Anxiety and Depressed Mood
309.3	Adjustment Disorder with Disturbance of Conduct
309.4	Adjustment Disorder with Mixed Disturbance of Emotions and Conduct
309.9	Adjustment Disorder Unspecified

As both acute and posttraumatic stress disorder are crucial for the present thesis, their DSM-IV-TR (American Psychiatric Association, 2000) diagnostic criteria are specified in the following sections.

1.2.1.2 Acute Stress Disorder

If an individual experiences intense fear, helplessness or horror while being confronted with a traumatic event, criterion A of the DSM-IV-TR's (American Psychiatric Association, 2000) Acute Stress Disorder is fulfilled. Analogous to PTSD, the symptoms of re-experiencing the event (criterion C), avoidance of stimuli that arouse recollections of the trauma (criterion D), and hyper-arousal (criterion E) also must be present. Additionally, three or more dissociative symptoms are required (criterion B). These symptoms need to cause clinically significant functional impairment (criterion F) and last for between two days and four weeks (criterion G). Finally, other potential causes of the symptoms, like substance abuse, must be excluded (criterion H). Table 4 lists the DSM-IV-TR diagnostic criteria for Acute Stress Disorder (American Psychiatric Association, 2000).

Table 4.
DSM-IV-TR (American Psychiatric Association, 2000) diagnostic criteria for Acute Stress Disorder (308.3)

DSM-IV-TR	
A.	The person has been exposed to a traumatic event in which both of the following were present:
	1. The person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others.
	2. The person's response involved intense fear, helplessness, or horror. Note: In children, this may be expressed instead by disorganized or agitated behavior.
B.	Either while experiencing or after experiencing the distressing event, the individual has three (or more) of the following dissociative symptoms:
	1. A subjective sense of numbing, detachment, or absence of emotional responsiveness
	2. A reduction in awareness of his or her surroundings (e.g., "being in a daze")
	3. Derealization
	4. Depersonalization
	5. Dissociative amnesia (i.e., inability to recall an important aspect of the trauma)
C.	The traumatic event is persistently re-experienced in at least one of the following ways: recurrent images, thoughts, dreams, illusions, flashback episodes, or a sense of reliving the experience; or distress on exposure to reminders of the traumatic event.
D.	Marked avoidance of stimuli that arouse recollections of the trauma (e.g., thoughts, feelings, conversations, activities, places, people).
E.	Marked symptoms of anxiety or increased arousal (e.g., difficulty sleeping, irritability, poor concentration, hyper-vigilance, exaggerated startle response, motor restlessness).
F.	The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning, or in the individual's ability to pursue some necessary task, such as obtaining necessary assistance or mobilizing personal resources by telling family members about the traumatic experience.
G.	The disturbance lasts for a minimum of 2 days and a maximum of 4 weeks and occurs within 4 weeks of the traumatic event.
H.	The disturbance is not due to the direct physiological effects of any substance (e.g., a drug of abuse or medication) or a general medical condition, is not better accounted for by a Brief Psychotic Disorder, and is not merely an exacerbation of a pre-existing Axis I or Axis II disorder.

1.2.1.3 Posttraumatic Stress Disorder

School-age Children

For school-age children, the DSM-IV-TR criteria for PTSD (American Psychiatric Association, 2000) are usually used. The original criteria are shown in Table 5.
Criterion A states that a traumatic event must be considered the disorder's direct cause. This criterion is divided into objective (A1) and subjective (A2) criteria. Criterion B incorporates five re-experiencing symptoms, among which at least one must be present. Seven symptoms relating to the avoidance of trauma-related cues are subsumed within criterion C, and a minimum of three of these symptoms is required. Not fewer than two of the symptoms of increased arousal that are listed in criterion D are needed.

In order to diagnose PTSD, there must be some prior exposure to a traumatic event (criterion A), as well as the required number of symptoms from criteria B, C and D. Additionally, the symptoms must have lasted for at least one month (criterion E) and they have to cause clinically significant impairment in daily functioning (criterion F).

To generate a more developmentally-sensitive view of PTSD in school-age children, Scheeringa et al. (2011b) proposed several adaptations to the DSM-5 criteria in this age-group. They suggested extending criterion A1 to include loss, placement in foster care, and the injury or death of a loved one as traumatic events; and deleting or broadening criterion A2 with additional emotional reactions (worry, sadness, crying, numbness, and confusion). For criteria B, C and D, they recommended that the onset of symptoms need not be clearly identifiable, as some children may have experienced life-long traumatization. Additionally, there might be other, developmentally more appropriate symptoms, which still need to be identified through further research. Finally, as suggested for toddlers and pre-school children, they proposed reducing the required number cluster C symptoms from three to one (Scheeringa et al., 2011b).

In the final publication of the DSM-5 (American Psychiatric Association, 2013), criterion A2 was deleted, but loss and placement in foster care were not included as traumatic events. The onset of symptoms still must be clearly associated with the traumatic event. For the former cluster C (avoidance symptoms), three symptoms still are required: This cluster is now split into clusters C (avoidance of stimuli associated with the traumatic event) and D (negative alterations in cognition and mood). For cluster C, one symptom is required, while two are necessary for cluster D.

Toddlers and Pre-school Children

While for school-age children the DSM-IV-TR (American Psychiatric Association, 2000) criteria for PTSD have demonstrated good validity, this has not been the case for pre-school children and toddlers (Landolt, 2012; Scheeringa, Zeanah, Drell, & Larrieu, 1995). Why the conventional criteria are not adequate for younger children seems quite obvious. The traditional criteria demand introspective abilities beyond pre-schoolers' cognitive and linguistic developmental stage. Therefore, Scheeringa and colleagues developed objectively observable alternative criteria. These criteria exhibit considerably enhanced validity and sensitivity for toddlers and pre-school children relative to the DSM-IV-TR (American Psychiatric Association, 2000) diagnosis criteria (De Young, Kenardy, Cobham, & Kimble, 2012; Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2008; Scheeringa, Peebles, Cook, & Zeanah, 2001; Scheeringa et al., 1995; Scheeringa, Zeanah, Myers, & Putnam, 2003).

Table 5.
DSM-IV-TR (American Psychiatric Association, 2000) and alternative PTSD-Criteria (Scheeringa et al., 2011b; Scheeringa et al., 1995; Scheeringa et al., 2003)

DSM-IV-TR Criteria	Alternative Criteria
A. The person has been exposed to a traumatic event in which both of the following have been present:	A.
1. The person has experienced, witnessed, or been confronted with an event or events that involve actual or threatened death or serious injury, or a threat to the physical integrity of oneself or others.	1. Same
2. The person's response involved intense fear, helplessness, or horror. Note: in children, this may be expressed instead by disorganized or agitated behavior.	Deleted
B. The traumatic event is persistently re-experienced in at least one of the following ways:	B. Re-experiencing. One or more items needed:
1. Recurrent and intrusive distressing recollections of the event, including images, thoughts, or perceptions. Note: in young children, repetitive play may occur in which themes or aspects of the trauma are expressed.	1. Posttraumatic play: compulsively repetitive, represents part of the trauma, fails to relieve anxiety and is less elaborate and imaginative than usual play
	2. Play re-enactment: represents part of the trauma but lacks monotonous repetition and other characteristics of posttraumatic play
	3. Recurrent recollections of the traumatic event other than what is revealed in play, and which is not necessarily distressing
2. Recurrent distressing dreams of the event. Note: in children, there may be frightening dreams without recognizable content	4. Nightmares: may have obvious links to the trauma or frequency with unknown content

Table 5.
DSM-IV-TR (American Psychiatric Association, 2000) and alternative PTSD-Criteria (Scheeringa et al., 2011b; Scheeringa et al., 1995; Scheeringa et al., 2003) (continued)

DSM-IV-TR Criteria		Alternative Criteria	
	3. Acting or feeling as if the traumatic event was recurring (includes a sense of reliving the experience, illusions, hallucinations, and dissociative flashback episodes, including those that occur upon awakening or when intoxicated). Note: in children, trauma-specific re-enactment may occur.		5. Episodes with objective features of a flashback or dissociation
	4. Intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event.		6. Distress at exposure to reminders of the event
	5. Physiologic reactivity upon exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event		
C.	Persistent avoidance of stimuli associated with the trauma and numbing of general responsiveness (not present before the trauma), as indicated by at least three of the following:	C.	Numbing of responsiveness. One item needed:
	1. Efforts to avoid thoughts, feelings, or conversations associated with the trauma		Deleted
	2. Efforts to avoid activities, places, or people that arouse recollections of the trauma		Deleted
	3. Inability to recall an important aspect of the trauma		Deleted
	4. Markedly diminished interest or participation in significant activities		1. Constriction of play. Child may have constriction of play and still have posttraumatic play or play re-enactment.
	5. Feeling of detachment or estrangement from others		2. Socially more withdrawn
	6. Restricted range of affect (e.g., unable to have loving feelings)		3. Restricted range of affect
	7. Sense of foreshortened future (e.g., does not expect to have a career, marriage, children, or a normal life span)		Deleted
			4. Loss of acquired developmental skills, especially language regression and loss of toilet training
D.	Persistent symptoms of increasing arousal (not present before the trauma), indicated by at least two of the following:	D.	Increased arousal. Two[1] items needed:
	1. Difficulty falling or staying asleep		1. Night terrors
			2. Difficulty going to sleep which is not related to being afraid of having nightmares or fear of the dark
			3. Night-waking not related to nightmares or night terrors
	2. Irritability or outbursts of anger		Deleted
	3. Difficulty concentrating		4. Decreased concentration; marked decrease in concentration or attention span compared to before the trauma

[1] See Scheeringa et al. (Holahan & Moos, 1981)

Table 5.
DSM-IV-TR (American Psychiatric Association, 2000) and alternative PTSD-Criteria (Scheeringa et al., 2011b; Scheeringa et al., 1995; Scheeringa et al., 2003) (continued)

DSM-IV-TR Criteria	Alternative Criteria
4. Hyper-vigilance	5. Hyper-vigilance
5. Exaggerated startle response	6. Exaggerated startle response
	E. New fears and aggression. No[2] item needed:
	1. New aggression
	2. New separation anxiety
	3. Fear of toileting alone
	4. Fear of the dark
	5. Any other new fears of things or situations not to the trauma
E. Duration of the disturbance (symptoms in B, C, and D) is more than one month.	F. Same
F. The disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.	Same[3]

Symptoms that could not be objectively observed were either deleted or rephrased; the required number of symptoms present was reduced; and a new group of symptoms was added. The new criteria contain novel expressions of aggression, new separation anxiety, fear of toileting alone, fear of the dark, and fear of any other things or situations not obviously related to the trauma (Scheeringa et al., 1995). However, when tested, the last symptom group failed to substantially increase diagnostic validity (Scheeringa et al., 2003). These changes still remain close to the original criteria and are based upon the same understanding of the disorder as for adults. Table 5 compares the DSM-IV-TR criteria for PTSD (American Psychiatric Association, 2000) and the alternative criteria suggested by Scheeringa et al. (2011b; 1995; 2003).

In the *5th Edition of the Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), the suggestions encapsulated in Scheeringa's alternative criteria are considered in the "subtype of PTSD for children 6 years and younger" (American Psychiatric Association, 2013). Criterion A2 (intense emotional reaction) was deleted for the new subtype for pre-school children and symptoms were divided into three clusters: re-experiencing (B), avoidance and negative alterations in cognitions and mood (C), and increased arousal (D). Compared to the alternative criteria for PTSD in pre-school children (Scheeringa et al., 2003), the former items C3 "inability to recall trauma" and C7 "sense of foreshortened future" have been deleted. With regards to emotional states, a distinction is made between the "increased frequency of negative emotional states" (C3) and a "persistent reduction in the expression of positive emotions" (C6; American Psychiatric Association, 2013). In the subtype of PTSD for children

[2] See Scheeringa et al. (2003)
[3] See Scheeringa et al. (2003)

6 years and younger only one instead of three cluster C symptoms are required. For this new algorithm, two recent studies (De Young, Kenardy, & Cobham, 2011a; Scheeringa, Myers, Putnam, & Zeanah, 2012) demonstrated good validity and developmental sensitivity. Notably, to date, no instruments exist for the assessment of the DSM-5 PTSD criteria.

1.2.2 Epidemiology of PTSD in Children after Accidental Injuries

1.2.2.1 School-age Children

In a meta-analysis performed by Kahana, Feeny & Youngstrom (2006), a PTSD prevalence between 0% and 37.5% with a weighted mean of nearly 20% was identified. The children were diagnosed an average of five (*SD*=3.77) months after some unintentional injury. Eighteen studies were included in the study, among which 11 investigated road traffic accidents, two burns, three traumatic brain injuries, and two other accidents. The samples included 70.4 (*SD*=46.4) children, on average. The mean age of the children was 11.3 years (*SD*=1.4). In 11 of the 18 studies, a diagnosis of partial PTSD was included. Overall, 25% of the children fulfilled the criteria of partial PTSD, meaning that at least two PTSD symptoms were present. Considering specific clusters, 50.5% of the participants satisfied criterion B, 17.9% criterion C, and 32.5% criterion D.

In a recent epidemiological Swiss study (Landolt et al., 2013), PTSD prevalence in adolescents was roughly 10% after a severe accident (girls: 14.9%, boys: 6.4%).

Olofsson, Bunketorp und Andersson (2009) conducted a systematic review exclusively on the prevalence of PTSD after road traffic accidents. One to two months post accident, an average of 27% of children and adolescents still suffered from PTSD (*range*=18% to 34%). Three to six months after the accident, the overall mean percentage was 13% (*range*=6-23%).

As opposed to the relative wealth of papers on road traffic accidents, for burn injuries, no literature reviews and fewer prevalence studies are available. In one retrospective study, Stoddard, Norman & Murphy (1989) assessed 30 children and adolescents ages 7 to 19 years after burns. Applying the DSM-III criteria (American Psychiatric Association, 1980), 6.7% of the subjects met the criteria for PTSD. This prevalence increased to 26.7% when partial PTSD was taken into account. In another study (Landolt, Buehlmann, Maag, & Schiestl, 2009a), an average of 4.4 years after a burn injury, PTSD prevalence was 18.6% in a sample of 43 children ages 7 to 16 years.

Even though the rate of PTSD after a traumatic event usually diminishes significantly over time, some children do not appear to recover (Kronenberg et al., 2010). For instance, 2% of adolescents still suffer from PTSD between 5 and 16 years after a burn injury that occurred in early childhood (Thomas, Blakeney, Holzer, & Meyer, 2009). Likewise, 3 to 4 years after a

traumatic event, nearly half of 14 to 24-year old trauma victims with full or sub-threshold PTSD at baseline exhibit a chronic course (Perkonigg et al., 2005).

Recently, two research teams investigated trajectories in children and adolescents after traumatic events. Kronenberg et al. (2010) explored the theoretical concept of Masten & Obradovic (2008), whereas LeBrocque et al. (2010) investigated the trajectory concept proposed by Bonanno et al. (2004). Kronenberg et al. (2010) examined 9 to 18-year old children and adolescents after Hurricane Katrina over three years. LeBrocque et al. (2010) followed children ages 6 to 16 years for two years after a variety of injuries. Both studies affirmed the same three trajectories. The first trajectory was called a *resilient* (Bonanno, 2004) or *stress resistant* (Masten & Obradovic, 2008) course; these children were either not affected or only marginally affected during or after the trauma, and not disrupted in terms of their daily functioning. The second trajectory was called *recovery* (Bonanno, 2004) or *normal response and recovery* (Masten & Obradovic, 2008). This trajectory was characterized by sub-threshold or threshold levels of PTS symptoms, as well as by a significant disruption in functionality. However, within months, children with this trajectory recovered to the point of exhibiting good adaptive functioning. The final trajectory was called *chronic* (Bonanno, 2004) or *breakdown without recovery* (Masten & Obradovic, 2008). These youths presented with high levels of symptoms and dysfunction which failed to return to normal, even after two to three years (Kronenberg et al., 2010; Le Brocque et al., 2010). Neither study supported the concept of a *delayed symptom trajectory* (Bonanno, 2004) or *delayed breakdown* (Masten & Obradovic, 2008). This delayed course is defined by initially good adaptive functioning followed by increasing symptoms. There is only a small body of evidence supporting a delayed onset of symptoms, which at the same time indicates that sub-threshold symptoms usually precede a later full diagnosis (Bonanno & Mancini, 2008; Le Brocque et al., 2010). In these two studies, approximately half of the children were allocated to the resilient trajectory (45 %; Kronenberg et al., 2010; 55 %; Le Brocque et al., 2010) and roughly one third to the recovery trajectory (27 %; Kronenberg et al., 2010; 34 %; Le Brocque et al., 2010). The percentage of children who experienced a chronic course was greater in the hurricane sample (28 %; Kronenberg et al., 2010) than in the more general sample (11 %; 2010) (see Figure 2).

This research underlines how, though resiliency and recovery are the rule, a substantial number of children and adolescents continue to suffer from full or partial PTSD months to years after various traumatic events.

1.2.2.2 Toddlers and Pre-school Children

Two or more months after a traumatic event, like a motor vehicle collision, accidental injury, abuse, or witnessing violence, the prevalence of PTSD was 26% in a sample of 62 pre-school children ages 22 to 83 months (Scheeringa et al., 2003). In a further study, Sheeringa, Wright,

Hunt & Zeanah (2006) found, in a sample of twenty-one newborn to 6-year old children, a PTSD prevalence of 14.3% after various accidental injuries. When only assessing 2 to 6-years old pre-school children after a motor vehicle accident, the PTSD prevalence decreased to 10% (Meiser-Stedman et al., 2008).

After burns, among 76 toddlers 19 to 48 months old, 13.2% suffered from PTSD 15 months post-accident (Graf, Schiestl, & Landolt, 2011). De Young, Kenardy, Cobham and Kimble (2012) found a comparable prevalence of 10% in pre-schoolers between the ages of one and six years, six months after a burn accident.

Notably, all of the above-mentioned studies used the alternative criteria. However, when applying the DSM-IV-TR criteria and algorithm (American Psychiatric Association, 2000), the number of PTSD diagnoses decreased significantly in all studies. Scheeringa et al. (2003) even observed a decline from 26% to zero.

In line with research on PTSD trajectories in school-age children (Section 1.2.2.1), a more current study which examined 1 to 6-year old children within 6 months of a burn injury uncovered the same three trajectories listed above (De Young et al., 2012): 72 % of the individuals were *resilient*, 18% *recovered*, 8% had *chronic* PTSD. Supplementary, they found that 2% had a *delayed onset* trajectory. However, additional analyses on the three children with delayed-onset symptoms revealed that all three had exhibited pre-existing sub-threshold PTSS one month after the burn injury (De Young et al., 2012).

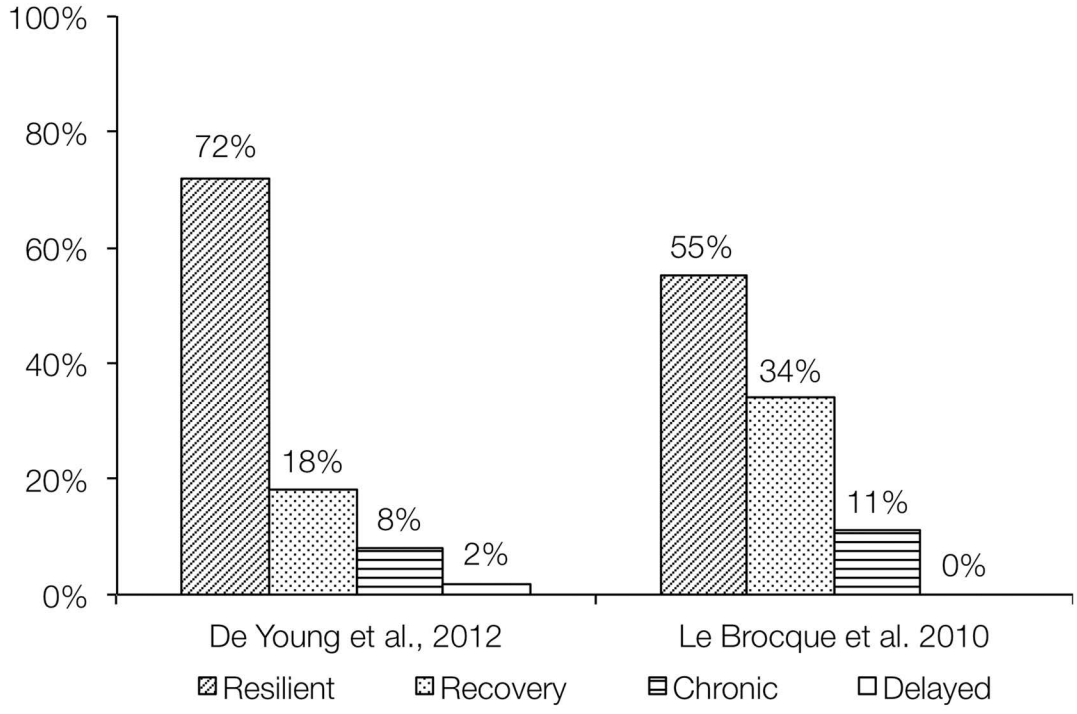

Figure 2.
PTSD trajectories in pre-school (De Young et al., 2012) and school-age children (Le Brocque et al., 2010) after burn injuries and diverse unintentional injuries, respectively.

In summary, as already noted for school-age children (see 1.2.2.1), after an accidental injury, most pre-school children are resilient against the development of PTSD or recover without any outside help. Nevertheless, a substantial number of pre-school children still suffer from PTSD even months after the accident.

1.2.2.3 Reasons for Differences in the Reported Prevalence Rates between Studies

The large range of prevalence rates between the various studies might be explained by the different methods by which rates were measured. For example, written questionnaires are potentially less accurate and less informative than in-person, clinical interviews (Landolt, 2012). For economic reasons, epidemiologic studies that survey large numbers of individuals rarely use in-person interviews. The degree of heterogeneity in the sample (e.g., age range, types of traumatic event) also influences outcomes considerably. A further cause of differences in prevalence rates may be the source of data (e.g., self-report versus parent-report) as well as the level of personal well-being of the proxy-reporting parent. Compared to studies with school-age children in which the child him- or herself usually is interviewed, the diagnostic investigation for PTSD in toddlers and pre-school children is exclusively based upon parental observations. One study involving school-age children showed that, relative to the child's self report, parents tend to underestimate the child's symptoms of re-experiencing and avoidance. This discrepancy decreases the older the child is (Schreier, Ladakakos, Morabito, Chapman, & Knudson, 2005). Therefore, it remains unclear whether parents are reliable at detecting, for instance, their child's flashback episodes or distress while the child is confronted with cues of the traumatic event. Some studies have shown that parents who suffer from acute or posttraumatic stress symptoms overestimate their child's stress symptoms. Conversely, parents with no stress symptoms tend to underestimate their child's stress symptomatology (Ghesquiere et al., 2008; Kassam-Adams, Garcia-Espana, Miller, & Winston, 2006). Even though the sensitivity of the PTSD diagnostic investigation can be improved by using the alternative criteria (see Section 1.2.1.3), it remains unclear to what extent the validity of the studies with toddlers and pre-school children might be biased because of the above-mentioned issues.

1.2.3 Pathogenesis of Acute and Posttraumatic Stress Disorder

In a meta-analysis published by Fletcher (1996) that incorporated 34 studies totalling 2697 children and adolescents exposed to trauma, approximately 36% of all children ultimately were diagnosed with PTSD. However, Dalgleish, Meiser-Stedman, & Smith (2005) point out that, across different studies, PTSD prevalence ranges from nearly absent to 100%. Therefore, factors over and above the traumatic event, as such, may play a significant role in the development and diagnosis of PTSD (Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012).

1.2.3.1 Models of Posttraumatic Stress Causation

Several models have been formulated to explain the interaction between risk and protective factors that contributes to the development of PTSD. What follows are descriptions of the four most strongly supported models.

Developmental Psychopathology Model of Childhood Traumatic Stress

Pynoos et al. (1999) outlined a developmental life-trajectory schema that takes into account diverse causes and mediators of acute and posttraumatic stress in the immediate and long-term aftermath of a traumatic event. The *developmental psychopathology model of childhood traumatic stress* distinguishes between sources of acute posttraumatic stress, mediating aspects of acute distress, and factors that influence early and ongoing adjustment. Causes of acute posttraumatic stress include the distressing traumatic experience itself (e.g., experiencing a threat to significant others, loss due to the event or subjective appraisals of the event); secondary adversities (e.g., additional adverse life events, medical issues, and disruption of the school community); and reminders of the trauma and/or loss (e.g., via the media or internal cues). The model implies that acute distress is mediated either by internal (e.g., coping strategies) or external (e.g., social context) resistance and vulnerability factors. Hence, a child's appraisal of the event and response to danger is influenced by inherent properties or the child's environmental response to the event. Finally, the success of early adjustment interacts with a child's proximal developmental tasks (e.g., trauma-related negative self-attributions may disturb a child's successful social integration and ultimately lead to social avoidance; while social support is crucial to psychological recovery after a traumatic event). Likewise, the presence of PTSD and co-morbid psychopathology (e.g., depression) interferes with further posttraumatic adjustment. In the long run, the above-mentioned characteristics remain important and play a role in the consolidation of chronic mal-adaptation. Besides trauma reminders, further secondary stressors, distal developmental tasks and psychopathology, the presence or absence of repeated traumatization has a large impact upon the chronicity of PTSD into adulthood (Pynoos et al., 1999).

Cognitive Model of Posttraumatic Stress Disorder

Ehlers and Clark's (2000) *cognitive model of persistent PTSD* suggests that, when trauma is processed in a way that leads to a sense of serious, current threat, recovery from PTSD is complicated. The authors mention two possible causes for a persistent sense of threat: (1) negative appraisals of the trauma and/or its sequelae; and (2) the nature of trauma memory. *Negative appraisals* of the traumatic event could be an overgeneralization of the trauma to future events or appraisals of how the individual felt or behaved during the event. Negative appraisals of the trauma sequelae might be how the initial PTSD symptoms, other people's

reactions, or the negative long-term consequences on one's life are interpreted. Negative appraisals would lead to the assumption of a permanent negative change in one's life for the worse. Due to the way trauma is encoded and stored in memory, *trauma memory* is fragmented. Hence, voluntary recall is incomplete, whereas involuntarily triggered vivid and emotional memories with a "here and now" quality are highly frequent. Additionally, connections to autobiographical information following the traumatic moment are absent. Consequently, trauma memories (i.e., re-experiencing symptoms) persistently cause a sense of current threat (Ehlers & Clark, 2000).

The authors claim a reciprocal relationship between the nature of the trauma memory and the appraisal of the trauma/sequelae. For instance, only memories are retrieved that are consistent with the individual's appraisals, or memory difficulties are appraised negatively (e.g., brain damage, or something unbearable to remember must have happened). Likewise, the "here and now" quality of trauma recollections leads to problematic appraisals. Finally, serious traumatization might even disorganize an individual's complete autobiographical memory, thereby disarranging their overall perceptions of themselves and their life (Ehlers & Clark, 2000).

To control currently-experienced threat and PTSD symptoms, individuals help themselves via a variety of strategies. However, most strategies chosen are maladaptive because they maintain PTSD. Ehlers & Clark identified three mechanisms: (1) strategies that produce PTSD symptoms directly (e.g., thought suppression directly increases intrusive recollections); (2) strategies that prevent change in negative appraisals (e.g., safety behaviors that target even minimal, anticipated catastrophes); and (3) strategies that prevent change in the nature of the trauma memory (e.g., not talking about the most distressing parts of the traumatic event) (Ehlers & Clark, 2000).

Integrative Model of Pediatric Medical Traumatic Stress

Kazak et al.'s (2006) *integrative model of Pediatric Medical Traumatic Stress* is conceptualized as a developmental model for stress that occurs over the course of an illness or injury that requires treatment and/or rehabilitation. Such stress in a child or adolescent has been termed *pediatric medical traumatic stress* (PMTS). This traumatic stress is understood as a process that is influenced by and altered at different moments over the course of the illness and its treatment. Furthermore, the model adopts a family perspective, whereas the child is examined within the context of his or her family (Kazak et al., 2006).

Three phases can be distinguished, where each phase represents a specific time-frame following a traumatic event and describes how the child and family perceive the PMTS and through which factors they might be influenced (Figure 3). Phase I focuses on peri-traumatic

factors, including the event itself, taking into consideration pre-existing factors and characteristics of the trauma. In this phase, interventions aim at changing the subjective experience of the traumatic event. In the aftermath of the traumatic event, in phase II, the child and family are confronted with issues regarding the child's further medical condition and ongoing medical treatment. Invasive medical procedures, pain and physical transformation (e.g., loss of hair from chemotherapy) impact a child and their parents' stress reactions. Worries regarding survival and relapse may be predominant. Hence, interventions initiated during phase II should aim to prevent the development of posttraumatic stress reactions in both children and parents. Many studies on pediatric injuries and life-threatening illness support the psychological long-term consequences that such injuries and illness exert on children and their parents. Recurring medical problems are common, which, in the long run, create a further psychological burden for the family. Thus, phase III looks at these longer-term mechanisms. The goal of intervention during this stage is to reduce existing posttraumatic stress symptoms (Kazak et al., 2006).

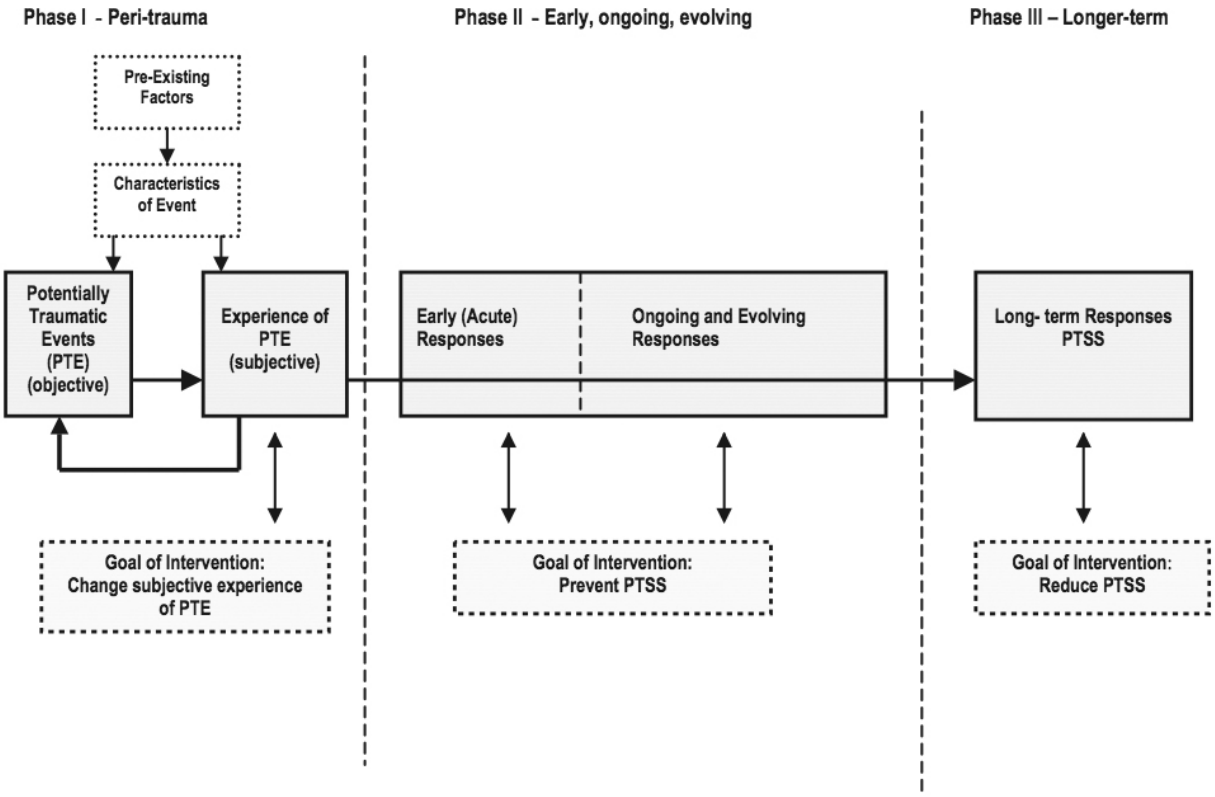

Figure 3.
Integrative model of Pediatric Medical Traumatic Stress (Kazak et al., 2006, p. 345)

In order to understand the child's and family's adjustment to pediatric healthcare, the integrative model proposed by Kazak et al. (2006) is based upon five fundamental assumptions: (1) Serious medically-related events have, in common, the phenomenon that beliefs about safety and invulnerability often are challenged by both parents and children.

This might happen, for example, by realizing that there is a life threat, by observing or experiencing pain, or by feeling uncertain about the ultimate outcome of the injury/illness. (2) Not all stress reactions that may occur in children and parents in the early aftermath of a traumatic event are pathological. Some less distressing and transient, but nevertheless upsetting traumatic stress reactions to medical events, may be adaptive. For instance, thinking frequently about the new diagnosis can be helpful to better integrate it into one's life. Conversely, to keep the stress level manageable, repeated avoidance of thoughts about the diagnosis can be useful. (3) Families of children affected by traumatic events present a range of pre-existing psychological function. Most are high functioning; but a minority is at risk for ongoing psychological difficulties. (4) Children are in continuous development. Therefore, a child's adjustment to pediatric healthcare is subject to that child's current developmental stage. (5) Interactions between the child and its social context are crucial to the child's adjustment to pediatric healthcare (Kazak et al., 2006).

Transactional Trauma Adaptation Model

Arguing that a traumatic event can be considered an extraordinarily distressing event, Landolt (2003) adapted the *Transactional Stress Adaptation Model* from Lazarus and Folkman (1984) to the area of the child and adolescent psychotraumatology. The adaptation to trauma is described as an active interaction between the trauma, the child, and the child's environment. A child's appraisal and coping moderate the impact of the characteristics of the trauma, the individuum, and the environment on the bio-psycho-social outcome. However, feedback processes also may moderate appraisal and coping behaviors. Predictors – serving as both risk and protective factors – can be attributed to each of these components. (Landolt, 2012).

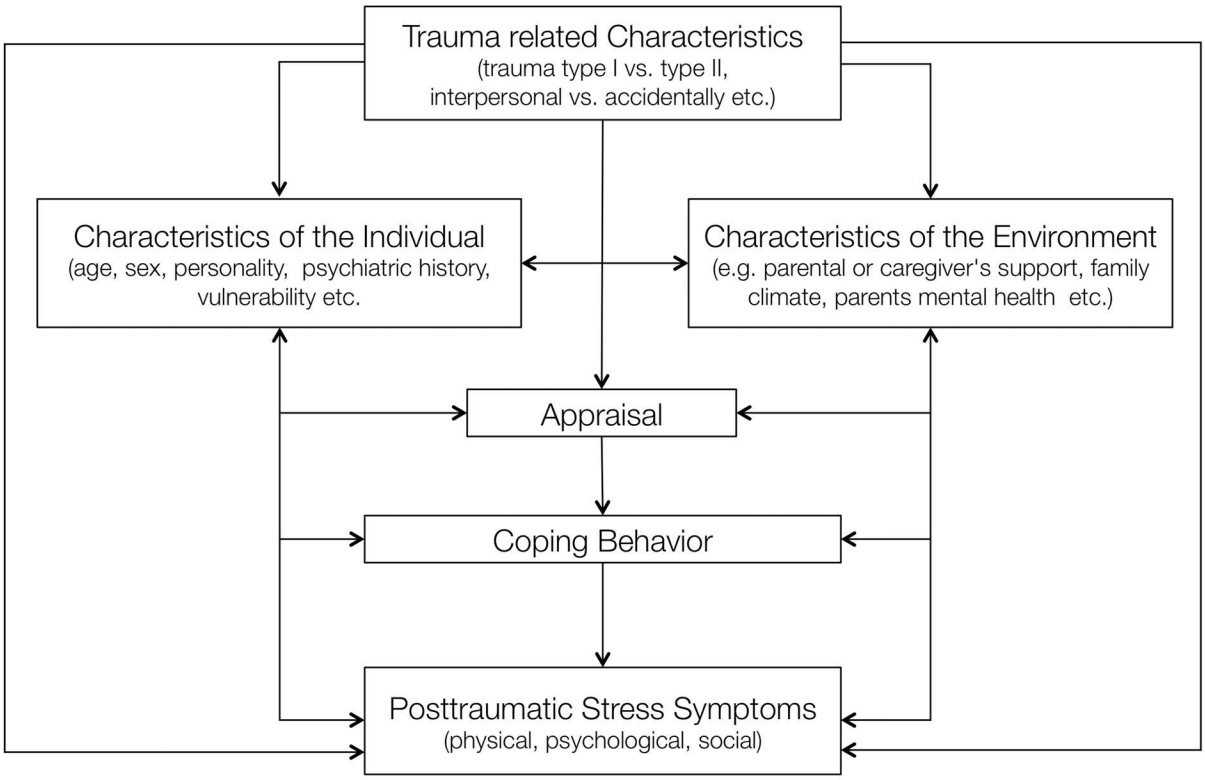

Figure 4.
Transactional Trauma Adaptation Model (Landolt, 2012, p. 81; translated by the author)

Summary

Each of the four models just described contributes to explaining the genesis of PTSD in children and adolescents. The developmental psychopathology model of childhood traumatic stress (Pynoos et al., 1999) and the integrative model of pediatric medical traumatic stress (Kazak et al., 2006) appear to be the most general and elaborate models, both representing a temporal and developmental perspective. Moreover, characteristics of the child, cognitive components, and environmental aspects are included. Nevertheless, the integrative model of Kazak et al. (2006) respects the supplemental factor of pediatric medical issues. This is crucial for traumatic events that require medical treatment. Inversely, the cognitive model of Ehlers and Clark (2000) emphasizes more specific mechanisms by providing a clear view of cognitive aspects that prevent successful recovery after a traumatic event. One strength of this model is its in-depth explanation of the harmful role of maladaptive strategies intended to control current life threat and stress symptoms. However, while such a model is helpful for adults and school-age children, it is hardly applicable in younger children. Furthermore, a mere cognitive view might not do justice to the complexity of the development of PTSD. Therefore, this extensive cognitive model could be placed within the framework of a larger and more abstract model.

Landolt (2012) stressed that the *transactional trauma adaptation model* is formulated based upon a high level of abstraction. Therefore, it is useful for the inclusion of a broad range of

research findings. Nevertheless, this concept is less helpful for the explanation of specific mechanisms. Hence, more differentiated constructs (e.g., trauma memory) must be drafted for each component. In the same way, detailed hypotheses cannot be drawn from this model. A further disadvantage is its failure to consider temporal and developmental perspectives.

1.2.3.2 Overview of Research on Predictors of PTSD

Because of the high level of abstraction in the transactional trauma adaptation model, this model was chosen to assign the predictors for the development of PTSD to its five areas: *trauma-related characteristics*, *characteristics of the individual* and of the *environment*, and the child's *appraisal* and *coping behaviors*. If necessary, predictors were grouped further based upon their *temporal* relationship to the initial traumatic event, into *pre-traumatic*, *peri-traumatic/trauma-related,* and *post-traumatic characteristics* (Cox, Kenardy, & Hendrikz, 2008).

Although literature reviews may be helpful, a meta-analytic approach additionally considers potential variations between studies (Trickey et al., 2012). Therefore, in the following section on predictors of PTSD in school-age children, only the results of meta-analyses are noted, as well as only predictors with significant and at least small mean effect sizes (d>=.20, r>=.10; Cohen, 1988).

The meta-analysis by Kahana et al. (2006) included 26 studies assessing potential predictors of PTSD in youths up to 18 years of age who had experienced either an accidental injury (n=18 studies; M=11.30 years; SD=1.41 years) or a severe illness (n=8 studies; M=13.39 years; SD=2.67 years). Studies on injuries caused by interpersonal assault were not included.

Cox et al. (2008) included 14 studies on accidental trauma in their meta-analysis. The age span in these studies was from 5 to 18 years. They analyzed eight risk factors, all of which were found to be significant.

Two recent meta-analyses included a broader range of traumatic events (Alisic, Jongmans, van Wesel, & Kleber, 2011; Trickey et al., 2012). However, Alisic et al. (2011) only included longitudinal studies, whereas Trickey et al. (2012) also reviewed cross-sectional investigations. The former meta-analysis incorporated 40 studies with children and adolescents ages one to 18 years (>75 % of studies included ages eight to 12 years). Effect sizes could be calculated for 12 predictors (Alisic et al., 2011). Trickey et al. (2012) included 64 studies with children and adolescents ages six to 18 years; for 25 predictors, effect sizes could be calculated.

Although there is a considerable body of research on early predictors of PTSD in school-age children and adolescents, for pre-school children such research is scarce. Consequently, for

pre-school children, no meta-analyses exist. Nevertheless, De Young et al. (2011b) conducted a literature review on risk and protective factors for long-term adverse outcomes exclusively in infants and young children up to 6 years of age. Therefore, the results of this review are reported.

1.2.3.3 Trauma related Characteristics

Trauma or, rather, *stressor severity* was the strongest trauma-related predictor; but, at the same time, the one with the largest variability with effect sizes found by Kahana et al. (2006) ranging from r=-.19 to r=0.55. No weighted effect sizes were computed, because the variability turned out to be highly significant (Q=85.58, p<.001). The reason for this variability might lie in the vaguely defined criterion for trauma severity rated by inconsistent sources of clinicians, parents, and youth (Kahana et al., 2006). However, a positive trend could be found, which is consistent with the significant findings of Trickey et al. (2012). Finally, two predictors had small effects: *bereavement* (Trickey et al., 2012) and *length of hospital stay* (Alisic et al., 2011) (Table 6).

For pre-school children, *type of trauma* (i.e., interpersonal trauma) and *degree of exposure* were identified as relevant predictors (De Young et al., 2011b).

Table 6.
Overview of trauma related predictors of PTSD in school-age children

Predictor	Effect size r	95% CI	Temporal allocation of predictor	Meta-analysis
Trauma/stressor severity	-.19; .09; .21; .39; 0.55	-	Peri-trauma	Kahana et al., 2006
Trauma/stressor severity	.29	.24 to .35	Post-trauma	Trickey et al., 2012
Bereavement	.22	.12 to .32		Trickey et al., 2012
Length of hospital stay	.18	.03 to .33		Alisic et al., 2011

1.2.3.4 Characteristics of the Individual

The multitude of risk factors related to the individual is discussed here from a temporal perspective.

Female gender (Alisic et al., 2011; Cox et al., 2008), *younger age* (Cox et al., 2008), *low intelligence* (Trickey et al., 2012), *pre-traumatic low self-esteem* (Trickey et al., 2012), and *pre-traumatic psychopathology* (Cox et al., 2008; Trickey et al., 2012) all were identified as minor pre-traumatic predictors (Table 7). In two studies (Chemtob, Nomura, & Abramovitz, 2008; Scheeringa, 2006), *pre-morbid behavioral difficulties* were found to be important predictors of PTSD in pre-school children (De Young et al., 2011b).

Alisic et al. (2011) identified an *elevated heart rate* immediately following trauma as a moderately strong peri-traumatic predictor (Table 7). Likewise, in pre-school children, Stoddard et al. (2006) identified a considerable influence of *pulse rate* on acute stress symptoms by the use of a path analysis (β=.43; De Young et al., 2011b).

Table 7.
Overview of individual predictors of PTSD in school-age children

Predictor	Effect size r	95% CI	Temporal allocation of predictor	Meta-analysis
Female gender	.13	.08 to .17		Alisic et al., 2011
Female gender (initial assessment)	.18	-.01 to .28		Cox et al., 2008
Female gender (follow-up assessment)	.22	.06 to .28		Cox et al., 2008
Younger age	-.12	-.26 to .09	Pre-trauma	Cox et al., 2008
Low intelligence	.20	.08 to .32		Trickey et al., 2012
Pre-traumatic low self esteem	.16	.05 to .28		Trickey et al., 2012
Pre-traumatic psychopathology	.22	13 to .39[a]		Trickey et al., 2012
Elevated heart rate immediately following trauma	.18	.08 to .27	Peri-trauma	Alisic et al., 2011
Dissociation	.51; .87	-		Kahana et al. 2006
Acute stress symptoms	.51	.43 to .59		Alisic et al., 2011
Acute stress disorder	.43; .56	-		Kahana et al., 2006
Short-term PTSD symptoms	.56	.44 to .66		Alisic et al., 2011
Short-term PTSD	.64	.20 to 1.07		Trickey et al., 2012
Anxiety	.44	.31 to .57		Alisic et al., 2011
Anxiety	.41; .41; .63; .70	-	Post-trauma	Kahana et al., 2006
Internalizing behavior problems	.46	-		Kahana et al., 2006
Depressive Symptoms	.48	.32 to .61		Alisic et al., 2011
Depressive Symptoms	.47; .48; .62	-		Kahana et al., 2006
Comorbid psychopathology	.40	.34 to .47		Trickey et al., 2012
Social impairment	.20	-		Kahana et al., 2006
Social withdrawal	.38	.31 to .46		Trickey et al., 2012

[a] Range.

Dissociation (Kahana et al., 2006), *acute stress symptoms* (Alisic et al., 2011), *acute stress disorder* (Kahana et al., 2006) and *short-term posttraumatic stress symptoms* (Alisic et al., 2011), and *disorder* (Trickey et al., 2012) were identified as medium to strong post-trauma predictors. Further psychological problems that exhibited large effect sizes were: a*nxiety* (Alisic et al., 2011; Kahana et al., 2006), *internalizing behavior problems* (Kahana et al., 2006), *depressive symptoms* (Alisic et al., 2011; Kahana et al., 2006), and *co-morbid psychopathology* (Trickey et al., 2012). *Social impairment* (Kahana et al., 2006) and *social withdrawal* (Trickey et al., 2012) were reported as post-traumatic behaviors with medium to high predictive values (Table 7).

1.2.3.5 Characteristics of the Environment

From the social environment perspective, both *pre-* and *post-trauma life events* seem to exert a significant, but small influence on the development of PTSD (Trickey et al., 2012). *Low socio-economic status* had small (Trickey et al., 2012) to medium (Kahana et al., 2006) effect sizes. Likewise, *pre-traumatic parental psychological problems* (Trickey et al., 2012) and

parental acute and posttraumatic stress (Alisic et al., 2011; Cox et al., 2008) exerted little to only a moderate negative influence on a child's recovery. *Low social support* (Kahana et al., 2006; Trickey et al., 2012) and *parental post-traumatic psychological problems* (Trickey et al., 2012) might have impaired child recovery after a traumatic event, whereas *poor family functioning* (Trickey et al., 2012) appeared to be a somewhat stronger predictor (Table 8).

Table 8.
Overview of environmental predictors of PTSD in school-age children

Predictor	Effect size r	95% CI	Temporal allocation of predictor	Meta-analysis
Pre-trauma life events	.21	.11 to .31	Pre-trauma	Trickey et al., 2012
Post-trauma life events	.21	.14 to .28	Post-trauma	Trickey et al., 2012
Low socio-economic status	.16	.05 to .28		Trickey et al., 2012
Low socio-economic status	.45[a]	-	Pre-trauma	Kahana et al., 2006
Pre-traumatic parental psychological problems	.12	.02 to .22		Trickey et al., 2012
Parental acute and posttraumatic stress	.34	.24 to .43		Alisic et al., 2011
Parental acute and posttraumatic stress (initial assessment)	.29	.04 to .65		Cox et al., 2008
Parental acute and posttraumatic stress (follow-up assessment)	.41	.29 to .55	Post-trauma	Cox et al., 2008
Low social support	.14[a]	-		Kahana et al., 2006
Low social support	.33	.13 to .53		Trickey et al., 2012
Parental posttraumatic psychological problems	.29	.22 to .36		Trickey et al., 2012
Poor family functioning	.46	.15 to .77	Pre-trauma	Trickey et al., 2012

[a] Effect size d.

Reviewing the literature, De Young et al. (2011b) identified the following environmental risk factors in young children: *parental psychopathology*, *insecure attachments*, *poor parenting skills*, and *poor family functioning*. The authors pointed out how parent-child interactions are crucial to a young child's recovery after a traumatic event. Hence, identified risk factors must be understood in terms of how they interact with each other. For example, a pre-traumatic parent-child relationship associated with a secure sense of attachment for the child allows the child to more adequately regulate their emotions, which might help them to cope with potential stressors. Nevertheless, in stress situations that emerge within the first few years of life, a child is still highly dependent upon its parents' ability to cope with stressing events. Therefore, besides the quality of attachment, parental reactions play an important role in a young child's coping. This is why parents' post-traumatic psychological health and parenting style impacts a child's recovery. An emotionally withdrawn, unresponsive or unavailable parent cannot fulfil their child's emotional needs. Similarly, distressed, anxious or overprotective parents may impair a child's habituation to the event by hindering their exposure to traumatic reminders. Consequently, a parent's stress reactions may have a deleterious effect, even in the setting of a previously secure attachment between child and parent. Inversely, a child's stress reaction may influence a parent's distress and parenting practices (specifically parents suffering from a sense of guilt or blame). Finally, the child

could be even more confused and consequently reinforce its problem behaviors (De Young et al., 2011b).

1.2.3.6 Appraisal

Processes of appraisal have a great influence on the course of stress reactions after trauma. For instance, *peri-traumatic fear* is a moderately strong predictor of later PTSD (Trickey et al., 2012). Likewise, *appraisal of trauma severity* – independent of objective criteria – as well as *perceived life threat* have a large influence on how successfully a traumatic event is processed (Cox et al., 2008; Kahana et al., 2006; Trickey et al., 2012) (Table 9).

Table 9.
Overview of appraisal as predictors of PTSD in school-age children

Predictor	Effect size r	95% CI	Temporal allocation of predictor	Meta-analysis
Peri-traumatic fear	.36	.13 to .59	Peri-trauma	Trickey et al., 2012
Appraisal of trauma severity / perceived life threat	.38	.28 to .52		Cox et al., 2008
Appraisal of trauma severity / perceived life threat (illness sample)	.19	-		Kahana et al., 2006
Appraisal of trauma severity / perceived life threat (injury sample)	.38	-		Kahana et al., 2006
Appraisal of trauma severity / perceived life threat	.36	.31 to .42		Trickey et al., 2012

From a clinical perspective, guilt about the traumatic event might be an important risk factor for long-term posttraumatic distress. However, no meta-analysis included a child's guilt as predictor for child PTSD. Few studies investigated the impact of parental feeling of guilt on the long-term distress in parents of children who experienced a burn accident (Bakker, Van Loey, Van Son, & Van der Heijden, 2010; Cella, Perry, Kulchycky, & Goodwin, 1988). Bakker et al. (2010) found that particularly mothers who feel guilty about the burn accident and whose children exhibit more extensive permanent scarring are at risk for long-term posttraumatic distress. Although it was not tested whether the parental feeling of guilt is a direct predictor of child PTSD, it might at least indirectly impact a child's PTSD: Parental feeling of guilt influences – moderated by the child's permanent scarring – the parental long-term posttraumatic distress which in turn impacts the child's posttraumatic stress symptoms (Figure 5). The latter relationship is supported by the finding that parental posttraumatic stress is a consistent predictor of child posttraumatic distress after unintentional injury (Brosbe, Hoefling, & Faust, 2011).

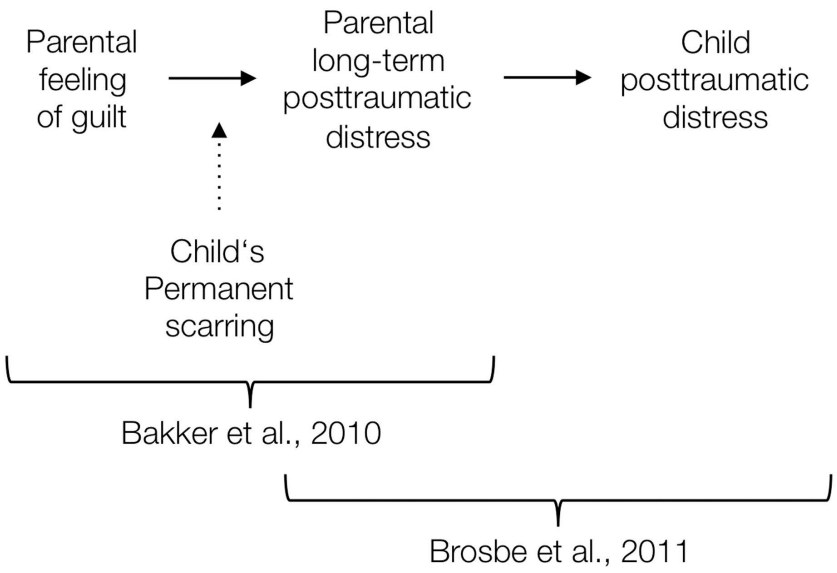

Figure 5.
Potential indirect impact of parental feeling of guilt on a child's posttraumatic distress

A few studies (Green et al., 1991; Scheeringa et al., 2006; Scheeringa & Zeanah, 1995) have revealed *witnessing threat to self or a primary caregiver* as impacting even a young child's recovery after traumatic exposure (De Young et al., 2011b).

1.2.3.7 Coping Behaviors

Active thought suppression, *blaming others* and *distraction* were identified as significant dysfunctional coping behaviors (Trickey et al., 2012) (Table 10). Notably, Stallard, Velleman, Langsford, & Baldwin (2001) pointed out that behaviors such as thought suppression and distraction can be considered either a diagnostic symptom or a coping strategy. Consequently, because of this confusion, final conclusions with regards to the relationship between PTSD and coping strategies remain outstanding (Stallard et al., 2001).

Table 10.
Overview of coping behaviors as predictors of PTSD in school-age children

Predictor	Effect size r	95% CI	Temporal allocation of predictor	Meta-analysis
Active thought suppression	.70	.51 to .88		
Blaming others	.47	.14 to .81	Post-trauma	Trickey et al., 2012
Distraction	.47	.12 to .83		

1.2.3.8 Summary and Conclusions

The current literature on predictors of PTSD in school-age children can be summarized as follows: Although trauma-related characteristics have some relevance, relative to other predictors they can be considered subordinate. The factor that appears to exert the greatest influence is trauma severity. However, the importance of trauma severity might be moderated

by an individual's appraisal of the event and their perceived degree of life threat. Considering the characteristics of the child, pre-traumatic factors (e.g., gender, younger age, and pre-traumatic psychopathology) have considerably less impact than post-traumatic psychopathology (e.g., anxiety, internalizing behavior problems, depressive symptoms, and acute and early posttraumatic stress symptoms). Likewise, pre-traumatic parental and familial functioning is secondary, relative to post-traumatic parental stress and psychopathology and post-traumatic social support and familial functioning. A child's appraisal and coping behaviors post-event have been shown to exert a large influence on a child's psychological recovery. However, it remains unclear whether social withdrawal, distraction or thought suppression should be considered maladaptive coping-skills or actual posttraumatic stress symptoms (Stallard et al., 2001).

The body of research on predictors of PTSD in pre-schoolers is much smaller than for school-age children. Consequently, no meta-analyses for this understudied age-group exist. Nevertheless, the literature review of De Young et al. (2011b) allows for certain suggestions to be made. For instance, the type of trauma (interpersonal vs. accidental) and the degree of exposure to the trauma appear to be crucial. Relative to school-age children, in pre-schoolers pre-traumatic behavioral problems appear to be of greater significance. De Young et al. (2011b) stress the meaningfulness of parent-child interactions reflected in parent-child attachments, educational skills and family functioning. While for their cognitive developmental stage, coping-skills in this age-group are of little to no importance, the young child's appraisal of threat to self or to their primary caretaker seems to be fundamental.

Ultimately, post-traumatic and subjective factors appear to be more predictive of PTSD than pre-traumatic and objective factors, respectively. Moreover, this is true for both the child and the child's environment.

1.3 Secondary Prevention after Type I Trauma

1.3.1 Definitions

1.3.1.1 Primary, Secondary and Tertiary Prevention

In Gerald Caplan's principles of *preventive psychiatry*, three types of prevention are described: (1) *Primary prevention, which consists of* "programs for reducing the incidence of mental disorders of all types in a community" (Caplan, 1964, p. 16); (2) *Secondary prevention,* which is programs for reducing "the duration of a significant number of those disorders which do occur" (Caplan, 1964, pp. 16-17); and (3) *Tertiary prevention, entailing* programs for reducing "the impairment which may result from those disorders" (Caplan, 1964, p. 17).

Today's early psychological interventions generally are most tied into Caplan's concept of secondary prevention (Slaikeu, 1990).

1.3.1.2 Acute and Early Psychological Intervention

According to the DSM-IV-TR (American Psychiatric Association, 2000), an *Acute Stress Disorder* occurs within 4 weeks of a posttraumatic event, and lasts between two days and, at a maximum, four weeks. Conversely, according to the ICD-10, the *Acute Stress Reaction* after a traumatic event emerges within minutes and only lasts for hours to, at most, three days. Reflecting these differences defining the time criterion for acute posttraumatic stress, the time span required for a psychological intervention to be classified *early* is broader in the Anglo-Saxon than European literature (Slaikeu, 1990). This being said, no consistency can be found in any language area. Therefore, Zehnder, Hornung, & Landolt (2006) divided the field of posttraumatic interventions corresponding to the DSM-IV-TR (American Psychiatric Association, 2000) time criterion of Acute and PTSD into *secondary prevention* and *psychotherapeutic interventions*, respectively (Figure 6). Secondary prevention takes place within the first four weeks post trauma. This immediate psychological help after a traumatic event aims to prevent the development of long-term psychological maladjustment (e.g., PTSD). Conversely, later psychological help – months or even years after the event – strives to treat fully-developed psychological disorders such as PTSD or Adjustment Disorder. Therefore, these interventions are classified as psychotherapeutic and, thereby, as tertiary prevention (Zehnder et al., 2006). Depending on when secondary prevention takes place, Landolt (2012) distinguished *acute* and *early* interventions. Acute interventions are delivered within the first hours to days after a traumatic event, whereas *early interventions* take place subsequently, within the first days up to 4 weeks after trauma (Zehnder et al., 2006).

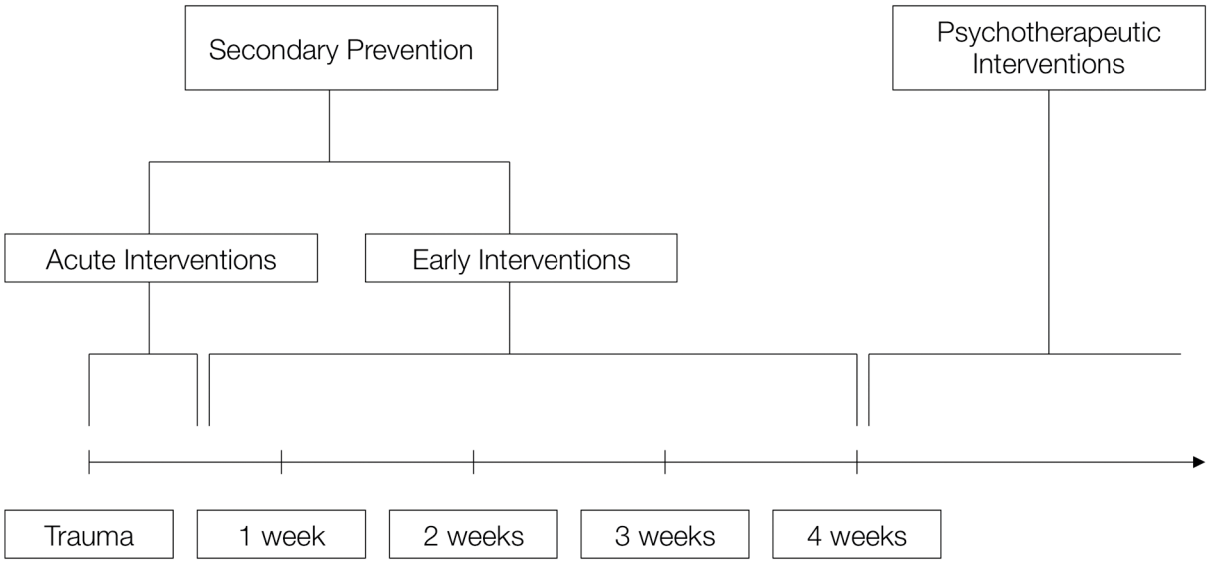

Figure 6.
Classification of post-traumatic interventions (Zehnder et al., 2006, p. 679; translated by the author)

Today's acute interventions primarily attempt to increase stabilization. Therefore, the emphasis is on basic needs like physical and emotional safety (Zehnder et al., 2006). Following the acute phase, when the child feels more stable and safe, the focus shifts towards reducing acute stress symptoms to prevent the development of long-lasting psychological maladjustment, and to processing of the event. Consequently, subsequent early interventions tend to deal with these issues (Landolt, 2012).

Table 11 lists further criteria to differentiate between acute and early psychological interventions.

Table 11.
Criteria to distinguish between acute und early psychological interventions (Zehnder et al., 2006, p. 679; translated by the author)

Criterion	Acute Intervention	Early Intervention
Time point post-trauma	Hours up to days after the trauma	Days up to 4 weeks after the trauma
Place of intervention	At the site of the event	Not on-site
Aim of intervention	Stabilization, prevention of psychological decompensation	Treatment of trauma, reduction of acute stress symptoms
Methods	Supportive	Psycho-educative, trauma-focused
Content	Creation of security, orientation, activation of social support	Information brokering, cognitive understanding of the event, stress-management
Occupational category	Aiders of different occupational categories	Psychological experts

1.3.2 Historical Background

The very beginning of crisis intervention dates back to 1906 when Edward Stierlin (1909) systematically examined the psychological sequelae of a European mining disaster. Further meaningful investigations were conducted during World Wars I and II (Landolt, 2012). Salmon (1919), for instance, found that war neuroses among British and French soldiers were treated more effectively when first-line psychiatric health care was closer to the front in World War I (Everly & Mitchell, 2002). Together with the insights of Kardiner and Spiegel (1919), these findings support the three core principles of early interventions: fast onset, territorial proximity, and the development of appropriate expectations (Kardiner & Spiegel, 1947). After World War II, based upon studies on the bereavement reactions of loved ones of those killed in the Coconut Grove night club fire, Eric Lindemann (1944) developed the fundamentals of *crisis theory*. Referring to this work, Gerald Caplan (1944) formulated the concept of *preventive psychiatry* (Caplan, 1964). These research efforts led in the 1960's and 1970's to the emergence of an immense number of day hospitals and telephone help lines (Everly & Mitchell, 2002).

Table 12.
The seven steps of initial defusing (Mitchell & Everly, 1997)

Phase	Process
Introduction	Introducing intervention team members Explaining the aims of defusing Summarizing the main guidelines of defusing
Exploration	Exploring the crisis and its potential impact with the help of facts and personal reactions
Information	Conveying basic knowledge about stress and stress factors Normalizing the experiences and reactions of the group Teaching practical stress survival skills to the group

The earliest description of the systematic use of debriefing was by Marshall (1944, 1947). The rationale behind this *historical group debriefing* was to gather factual data about events that happened during World War II. Nevertheless, Marshall was aware of the probable psychological benefits of these meetings. The unstructured session lasted several hours and took place quite soon after combat within a group setting (Everly & Mitchell, 2002). Finally, Mitchell and Everly (Mitchell, 1983; Mitchell & Everly, 1993) developed the first standardized crisis intervention (Stallard & Salter, 2003). *Critical Incident Stress Management* (*CISM*) contains immediate and delayed components. For immediate intervention within the first 12 hours of a traumatic traumatic event, *defusing* is intended to diminish psychological tension and dissonance to help the individual regain function. Within three steps (Table 12) the person concerned is encouraged to accept his or her reaction as a normal response to an extraordinary event and to extend his/her own view and understanding of the event. This single-session intervention lasts from 20 to 45 minutes and is carried out in a small group of individuals (Mitchell, 1983; Mitchell & Everly, 1993). However, no adaptations exist for children and no studies examining the effectiveness of defusing are available (Everly & Mitchell, 2002).

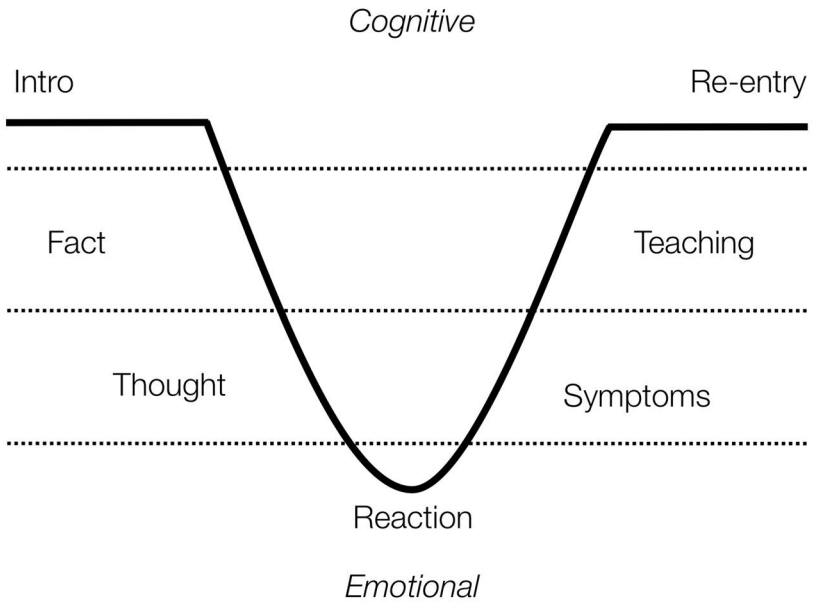

Figure 7.
The 7 steps of Critical Incident Stress Debriefing *(Mitchell & Everly, 1997)*

Table 13.
The seven stages of Critical Incident Stress Debriefing (Mitchell & Everly, 1997)

Stage	Process	Area
1. Introduction	To introduce intervention team members, explain the process, set expectations	cognitive
2. Fact	To describe traumatic events from each participant's perspective at a cognitive level	cognitive
3. Thought	To allow participant's to describe cognitive reactions and to transition to emotional reactions	cognitive → affective
4. Reaction	To identify the most traumatic aspect of the event for the participants	affective
5. Symptom	To identify personal symptoms of distress and then transition back to a cognitive level	affective → cognitive
6. Teaching	To educate as to normal reactions and adaptive coping mechanisms. (i.e., stress management); to provide a cognitive anchor	cognitive
7. Re-Entry	To clarify ambiguities and prepare for termination	cognitive

Critical Incident Stress Debriefing (*CISD*) is the delayed component of CISM, which takes place one to 10 days post-event. Targeted individuals are those who have experienced a traumatic event, either as a primary victim or secondary traumatized observer. The aim is to decrease the risk of long-term morbidity. In a single group session, participants are guided through seven stages (Table 13), which lead from a cognitive perspective to an affective one and finally back to a cognitive point of view (Figure 7).

Dyregrov (1991) suggested an adaptation of psychological group debriefing for children (Mitchell & Everly, 1997). He described six phases through which the moderator leads participants through the debriefing session. In the first phase, children are introduced to the purpose, the course and the rules of the session. The second stage focuses on the facts. Thereby, the event is reconstructed in detail until a common understanding can be found. The debriefing's core phases are stage 3 (thoughts) and 4 (emotions), during which the children are encouraged to talk about their thoughts and feelings during the event. To facilitate a child's participation, he or she might be asked to draw a picture of the event or about what they felt during the event. Possible feelings such as guilt, anxiety and shame are addressed throughout these stages. In the fifth phase, psycho-education about acute stress symptoms and possible coping strategies is given. The presence of stress reactions is explicitly normalized. The session is closed by summarizing the meeting and discussing unanswered questions. Information on further assistance is provided and particularly distressed children are followed up by the moderator (Dyregrov, 1991).

Pynoos and Eth (1986) were the first to describe a standardized individual crisis intervention for children (Stallard & Salter, 2003). This single-session intervention was structured as an interview containing three stages (opening, trauma, and closure). These authors explicitly limited the interview to the child alone, without involving any other person. Each of the stages contained several cognitive, emotional and behavior-related intervention elements (Table 14). Although the authors did not refer to the concept of psychological debriefing, the structure and preventative aim of the child interview was similar (Pynoos & Eth, 1986).

Table 14.
Overview of Pynoos and Eth's (1986) child interview

First stage: Opening	
Establishing the focus	Introduction, possibly together with others (e.g., family members or relatives); the interviewer informs the child that he has already met several children who experienced a comparable event; ultimately continues without others
Free drawing and story-telling	Child is invited to draw any picture of choice that ultimately tells a story
Traumatic reference	The interviewer identifies any potential trauma reference(s) in the picture and tries to gently get introduce it(them) into conversation with the child
Second stage: Trauma	
Reliving the experience	
Emotional release	The interviewer expresses comfort as soon as the drawing and story-telling releases the child emotionally; before progressing further, a state of at least minimal emotional stability must be attained
Reconstruction	
Perceptual experience	The child is supported to focus on the central action of the event, when physical harm was caused; the child may use toys to support the story's telling; sensory perceptions are reactivated by asking for bodily sensations the child felt during the event
Special detailing	Attention is paid towards any details that might reflect biased cognitions
Worst moment	The child is asked about the worst moment of the event
Violence/physical mutilation	The child is encouraged to draw the moment of physical violence; if someone has died, to remind the child of the physically-intact deceased, a picture should be looked at
Coping with the experience	
Issues of human accountability	Who the child holds responsible for the act is explored, as is the child's own understanding of the motive behind the event, and belief about how the event could have been prevented
Inner plans of action	The child is asked to formulate a plan of action that could have remedied the situation
Punishment or retaliation	If the formulation of inner plans of action raises the question of punishment or retaliation, the child is given permission to fully express these feelings before returning to their ideas regarding what they could have done
Counter-retaliation	Discussion focuses on the child's thoughts and sorrows regarding the possible return of the perpetrator
Child's impulse control	The child's anger management is explored
Previous trauma	The child is allowed to spontaneously report previous traumatic events
Traumatic dreams	Inquiries are made about recent dreams
Future orientation	The child's concerns for the future are explored, especially relating to the dangers of interpersonal relationships

Table 14.
Overview of Pynoos and Eth's (1986) child interview (continued)

Current stresses	Life stressors caused by the traumatic experience are addressed
Third stage: Closure	
Recapitulation	The session is reviewed and summarized by returning to the initial drawing and story; what is understood about the child's thoughts and feelings is expressed, and their universality emphasized
Realistic fears	The child's fear during the event is normalized
Expectable course	The child is prepared for what he or she probably will face in upcoming days (e.g., bad dreams, recollections, or unpleasant feelings)
Child's courage	The child's bravery is acknowledged
Child's critique	The child is asked about their opinion about how the interview went
Leave-taking	Respect for the child is expressed; and the child is informed about the future availability of the therapist

1.3.3 Acute Interventions

The *Psychological First Aid* (PFA; Brymer et al., 2006) model is suggested as today's acute intervention of choice for children, adults and families after disaster and terrorism (Landolt, 2012). The PFA is considered "evidence-informed", meaning that even though systematic empirical research is outstanding, many of its components are supported by empirical findings (Brymer et al., 2006). The PFA strives to ameliorate acute distress and promote appropriate adaptations to the traumatic event, while it remains committed to four basic standards, which are that it is:

1. Consistent with research evidence on risk and resilience following trauma
2. Applicable and practical in field settings
3. Appropriate for developmental levels across the lifespan
4. Culturally informed and delivered in a flexible manner (Brymer et al., 2006, p. 5)

PFA not only targets individuals at high risk, but offers support for adaptive coping and, therefore, recovery to every individual affected by a disaster. This procedure is based upon the assumption that people affected by disasters experience a variety of early reactions without necessarily being at high risk for developing long-term psychological problems (Brymer et al., 2006).

Table 15 lists the eight core components that constitute the PFA. These actions focus on one hand on immediate support with regards to basic needs, and on the other hand on support for the near future (e.g., linking with social contacts and/or collaborative services). The basic support addresses physical needs (e.g., ensuring immediate physical safety, providing blankets, nutrition and beverages), orientation (e.g., informing the victim what has happened and what is going to happen), practical assistance (e.g., identifying immediate needs and helping to create an action plan), emotional needs (e.g., being present, talking slowly and

quietly, helping the survivor to orientate, teaching simple relaxation techniques) and social support (Brymer et al., 2006).

Table 15.
The eight core components of Psychological First Aid (Brymer et al., 2006, p. 19)

Core Action	Goal
1. Contact and Engagement	To respond to contacts initiated by survivors, or to initiate contacts in a non-intrusive, compassionate, and helpful manner
2. Safety and Comfort	To enhance immediate and ongoing safety, and provide physical and emotional comfort
3. Stabilization (if needed)	To calm and orient emotionally overwhelmed or disoriented survivors
4. Information Gathering: Needs and Current Concerns	To identify immediate needs and concerns, gather additional information, and tailor Psychological First Aid interventions
5. Practical Assistance	To offer practical help to survivors in addressing immediate needs and concerns
6. Connection with Social Supports	To help establish brief or ongoing contacts with primary support persons and other sources of support, including family members, friends, and community helping resources
7. Information on Coping	To provide information about stress reactions and coping to reduce distress and promote adaptive functioning
8. Linkage with Collaborative Services	To link survivors with available services needed at the time or in the future

The PFA manual addresses special issues for the support of children and adolescents. Generally, the developmental stage of child should be taken into account (Brymer et al., 2006).

To date, no research on acute interventions in children and adolescents exist. On one hand, it is methodologically difficult to conduct studies in an acute setting. On the other hand, randomized controlled trials (RCT) only would be ethical if the effectiveness of different procedures is compared; it is no longer considered ethical to have an untreated control group. Nevertheless, since the PFA is an evidence-informed procedure, its use is justified (Landolt, 2012).

1.3.4 Early Interventions

1.3.4.1 State of Research

To date, seven RCTs on early intervention after a single traumatic event in children and adolescents have been published (Berkowitz, Stover, & Marans, 2011; Chapman, Morabito, Ladakakos, Schreier, & Knudson, 2001; Cox, Kenardy, & Hendrikz, 2010; Kassam-Adams et al., 2011; Schreier et al., 2005; Stallard et al., 2006; Zehnder, Meuli, & Landolt, 2010).

Chapman et al. (2001) conducted an RCT on the effectiveness of the self-developed *Chapman Art Therapy Treatment Intervention* (CATTI). The study involved 7 to 17 year-old children who had sustained an unintentional injury necessitating at least 24 hours of inpatient treatment. Eighty-five screened children determined to be at high risk for the development of

long-term PTSD were randomly allocated to either a treatment or a control condition within 24 hours of hospital admission. Children in the latter group were provided with standard hospital treatment. The target intervention was administered before the first follow-up assessment, one week post-trauma. PTSD symptoms were assessed further at one month as well as at six months if the child remained symptomatic. During the CATTI, in a single one-on-one session, each child is instructed to create drawings depicting the traumatic event until a complete narrative of the event is reconstructed. After each drawing is completed, the child is invited to comment on it. During the retelling of the event, several issues are addressed, including blame, shame and guilt, as well as misperceptions and rescue and revenge fantasies. Additionally, traumatic reminders, coping strategies and reintegration strategies are discussed.

In this study, no significant overall difference in patients' overall PTSD symptoms were identified between the intervention and control groups. However, the authors reported a non-significant reduction in avoidance symptoms at one week that was sustained through the one-month assessment.

The following limitations were listed: (1) injuries were only mild to moderate; (2) the sample of subjects was small; (3) the applied measures might not have been sensitive enough for the specific population of injured children; and consequently, (4) other outcome variables, such as depression and anxiety, should have been assessed; and (5) there was no attempt to control for additional traumatic events that might have occurred during the follow-up period (Chapman et al., 2001).

Four years later, Schreier et al. (2005) published a comparable study testing the effectiveness of the CATTI in 57 seven to 17-year old children after unintentional pediatric injuries. The CATTI was compared to non-psychotherapeutic standard hospital care in the immediate aftermath of the accident (12 to 24 hours). Children were reassessed one, six, and 18 months post-accident. Comparable to Chapman et al. (2001), no significant differences were found between the intervention and control groups, but non-lasting, significant intervention effects concerning avoidance/numbing symptoms were noted one month post-trauma (Schreier et al., 2005).

The small sample again was mentioned as a study limitation. Furthermore, a child's avoidance and parents' fears that confronting the traumatic event might worsen their child's stress reactions were discussed as possible reasons for non-participation. This might have affected the sample composition by lowering PTSD prevalence, thereby minimizing the treatment effect (Schreier et al., 2005).

The only published randomized controlled study on debriefing in children was conducted by Stallard et al. (2006), who compared the effectiveness of a single debriefing session with the

child alone versus a neutral, non-accident focused discussion. Debriefing included a structured and detailed reconstruction of the event. Additionally, cognitive and emotional reactions were identified and discussed. In the context of psycho-education, posttraumatic stress symptoms were declared a normal reaction to an extraordinary experience. Finally, coping strategies were taught and a leaflet with written information on how to cope with common problems was distributed. The authors claimed that this kind of debriefing was different from the original debriefing concept in two ways. First, Stallard et al.'s (2006) intervention was administered 28 days post-accident. Although the authors argued that early intervention should take place only when a child has managed to get over the immediate shock of the trauma, they also acknowledged that the intervention in their study was provided too late. Secondly, the debriefing in Stallard et al.'s (2006) study was provided individually and not in a group format (Stallard et al., 2006).

One hundred fifty-eight 7 to 18 year-old children who had been in road traffic accidents were enrolled in the study. Debriefing was carried out an average of four weeks after the accident. Outcome variables relating to PTSD symptoms, anxiety, depression and behavioral difficulties were assessed at baseline and at eight months follow-up (Stallard et al., 2006).

Although significant within-group decreases in PTSD symptoms, anxiety, and depression were noted, no significant inter-group differences were discovered for any outcome variable. Hence, the intervention was classified ineffective. However, the authors commented that the structured baseline assessment already might have had some therapeutic effect on all participants, including those randomly allocated to the control condition. For further research, the authors suggested that several assessments be conducted within a shorter time interval after the accident; for example, at one, three and six months, rather than just at eight months (Stallard et al., 2006).

Because the early intervention tested within the RCT conducted by Zehnder et al. (2010) included detailed trauma reconstruction, psycho-education and the teaching of coping-skills, it is quite comparable to the debriefing offered by Stallard et al. (2006). Following the suggestions of the latter, Zehnder et al. (2010) provided the intervention earlier, at 10 days post-accident, and performed follow-up assessments at both two and six months after the event. Moreover, the intervention was designed to be more age-appropriate via the use of non-verbal strategies (drawings and accident-related toys). Furthermore, children were socially supported by the inclusion of their parents (Zehnder et al., 2010).

PTSD symptoms, depressive symptoms and behavioral problems were assessed in 99 children ages 7 to 16 years after a road traffic accident. Significant time effects, but no significant between-group differences were found for the overall sample. This finding is consistent with Stallard et al.'s (2006) results. The authors concluded that (1) the early and highly-structured

baseline assessment might have had a therapeutic effect on both study groups by acknowledging, validating and normalising the child's symptoms; (2) the single-session intervention may have been too short to generate sustainable effects; (3) children in the control condition recovered well could reflect a high standard of medical care with generally good aftercare by paediatricians; and (4) early intervention might interfere with natural coping or defence mechanisms (Zehnder et al., 2010).

Nevertheless, in the subgroup of 7 to 11-year old pre-adolescent children, significant differences between the control and intervention arms were found for depression and behavioral problems at 6 months follow-up. This finding was attributed to the methodological amendments to the earlier study on debriefing. The current intervention was offered earlier but still at a time point at which children seemed to have overcome the initial shock and, therefore, be ready to psychologically deal with their accident. Furthermore, inclusion of a parent might have helped the child feel safer and led to more open intra-familial communication about the traumatic event. In the end, the age-appropriate trauma reconstruction with drawings and accident-related toys could have been more sensitive to younger children's cognitive stage of development (Zehnder et al., 2010).

It should be noted that no effects were found for PTSD symptoms – neither for the overall sample nor for the group of 7 to 11-year old pre-adolescents. This finding was explained by the use of self-report measures for depression and behavioral problems versus the clinical interviews for PTSD symptoms. Also, the low prevalence of PTSD argued for a generally well functioning health care system (Zehnder et al., 2010).

Remarkably, the three most recent studies did not include any trauma reconstruction (Berkowitz et al., 2011; Cox et al., 2010; Kassam-Adams et al., 2011). Cox et al. (2010) even focused solely on the provision of psycho-education. In fact, they offered no face-to-face intervention, merely handing out a booklet for parents and a one-sided information sheet with a link to web-based information for 7 to 16-year old children within one to two weeks of an unintentional injury (http://kidsaccident.psy.uq.edu.au). Families were given two to four weeks to consult the information. The PTSD symptoms of parents, children and adolescents, and dissociative symptoms, anxiety, depression, and anger of children and adolescents were assessed using a self-report measure 72 hours to one week pre-intervention and at 4 to 6 weeks and 6 months post-intervention. Children randomly allocated to the comparison group did not receive any psychological intervention (Cox et al., 2010).

The website provided age-specific information for children (≤ 10 years) and adolescents (≥ 11 years). The information for both children and parents aimed at normalizing and relieving trauma reactions. Practical strategies for children and adolescents included relaxation, coping statements, problem solving, focusing on pleasant events, identifying personal strengths, and

reflecting on the event. The parent's booklet contained information on common child reactions and their likely time course, suggestions on how to best assist their child's emotional recovery, on the parent's role in their child's recovery, and on coping strategies for their own distress (Cox et al., 2010).

Notably, although the intervention was age-specific, results were not presented for each age-group separately. Significant time by group interaction effects were noted for child anxiety. While anxiety symptoms among children randomly allocated to the intervention arm decreased over time, the anxiety of children in the control group increased over time. Though not statistically significant, the same pattern was identified for the remaining outcomes of anger, depression, PTSD symptoms and dissociation. In terms of parental PTSD symptoms, no significant differences between the intervention and control groups were found (Cox et al., 2010).

Some limitations of the study must be noted. First, acute stress reactions usually decrease over time. Surprisingly, this was not the case in the study by Cox et al. (2010); moreover, the authors failed to provide any possible explanation for this phenomenon in their sample. Second, children in the intervention group presented with more severe baseline symptoms. However, performing analysis of covariance with baseline symptom severity as a covariate, these pre-treatment group differences were adequately controlled. Third, at all time points, mean symptom severity for both parents and children were below clinically-significant levels. It is therefore questionable whether early intervention was needed within this sample. The authors refer to literature indicating that individuals with subclinical symptom levels are still at risk for potential psychopathology in the long run. Nevertheless, by eight months of follow-up among controls, long-term effects should have been apparent (Le Brocque et al., 2010), and no clinically significant symptom levels were observed. Fourth, only 56% of children viewed the website. This might reflect self selection in the sense that those children who felt fine might not have consulted the information provided. Inversely, all parents read the booklet at least once. Hence, it can be assumed that supporting parents may influence child reactions and, consequently, counterbalance their children's low participation rate. Fifth, there was a high drop-out rate; however, using intention-to-treat-analysis did not influence results. The authors discussed the possible influence of low baseline symptomatology on a family's decision not to continue the study (Cox et al., 2010).

The study that generated the most striking results was conducted by Berkowitz et al. (2011). In this study, the effectiveness of a 4-session *Child and Family Traumatic Stress Intervention* (CFTSI) protocol was compared to a 4-session comparison protocol that provided supportive counseling and psycho-education. The sample consisted of 106 seven to 17-year-old children who had just suffered range of traumatic events that included both unintentional injuries and interpersonal violence. A child was randomly allocated to either group only if he or she was

considered symptomatic after initial screening for the presence of at least one new PTSD symptom since the trauma. The CFTSI offered was a 4-session intervention with the child and the caregiver treated separately as well as together. The four sessions were completed within the first month of exposure to the traumatic event. PTSD symptoms, dissociation and anxiety were assessed as outcomes at baseline, at 4 weeks to 2 months from baseline, and at 3 months (Berkowitz et al., 2011).

For the CFTSI first session, only the child's caregiver was present. During this session, psycho-education regarding normal stress reactions to a traumatic event was provided, the protective role of family support stressed, external stressors related to the event identified, a plan for managing them developed and finally, several measures administered to the parent present. Over the following three sessions, the therapist first met with the child alone and then with the caregiver and child together. In session #2, the child was first administered a variety of measures to assess the outcome variables. Subsequently, responses from the child and those of the parents given in the first session were compared. This procedure aimed to improve communication between caregiver and child and to enhance the emotional support that the caregiver provided the child. Agreements between the two sets of responses was commended, whereas disagreements were used to enhance communication by helping the child to better describe his or her stress symptoms to the parent, and helping the parent to be more aware of, receptive to, and supportive of the child's symptoms. Finally, a selection of behavioral skills modules covering six topics was presented (sleep disturbance; depressive withdrawal; oppositionality/tantrums; intrusive thoughts; anxiety, avoidance and phobic reactions; and a general overview of traumatic stress symptoms and techniques to manage them). The authors claimed that each element is a well-accepted method drawn from the literature on the treatment of stress. The child and parent(s) then chose one or two of these topics to work on as homework before the next session. In sessions #3 and #4, the same measures administered in the preceding sessions were presented to the child and caregiver. Again, differences were discussed. Closing the session, the skill modules chosen by the child and parent were practiced. In session #4, depending upon the child's symptomatology, next steps like later re-evaluation or formal psychotherapy for PTSD were suggested (Berkowitz et al., 2011).

Those who were in the control arm of the trial completed the same PTSD outcome measures as those in the CFTSI group. The same was true for the assessment of stress symptoms, and for psycho-education, normalization and coping-skills. Furthermore, general relaxation techniques were taught. Chief differences between the treatment offered to the control versus CFTSI group were that, with the former, (1) only in the fourth session the caregiver was present together with the child; and (2) symptom ratings between the parent and child were

not compared in the control arm, so that caregiver-child communication training did not occur (Berkowitz et al., 2011).

Significant time-by-group effects were revealed for PTSD and anxiety symptoms, as well as significant inter-group effects for re-experiencing and avoidance symptoms. These results are remarkable because, on one hand, the intervention of interest was compared against a control intervention that contained many of the same elements. In fact, the two conditions were far more alike than dissimilar. On the other hand, per Cohen's (1988) convention, intervention effects ranged from small (effect size for arousal=-.36) to large (effect size for anxiety=-3.44) with an overall mean effect size of -1.18 (*SD*=.99).

However, the authors noted several important methodological weaknesses in their study. First, dropout rate across the sample population was high. It was claimed that, in urban child mental health treatment, high attrition rates are common. This being said, no attempt was made to clarify the reasons for drop-out or to otherwise adjust for them, so that it remains unclear whether the drop-outs biased study results or, if so, in which direction. Second, the studied sample was very heterogeneous, including accidental injuries and inter-personal violence. Hence, no statement regarding the effectiveness of the CFTSI for a specific type of trauma can be made. Third, because the mean number of previous traumatic events was high (6), it must be assumed that prior symptomatology existed and might have been fairly severe. Consequently, it is unclear whether the target intervention prevented the development of long-term morbidity from the most recent trauma, or whether it treated pre-existing PTSD.

The most recently published study compared a cognitive and behavioral intervention to non-psychotherapeutic standard hospital care in 8 to 17-year old children after an unintentional injury (Kassam-Adams et al., 2011). Eligible children were systematically screened with three brief measures for current traumatic stress symptoms, current depression symptoms, and the risk of persistent PTSD. Ultimately, 85 children were considered 'at risk' and therefore randomly allocated to receive either the control or target intervention. Pre-treatment assessment was performed within two weeks (*M*=2.3 days, *SD*=2.1 days). The first intervention session happened as soon as possible after the baseline assessment, with 93% transpiring within 7 days of the injury and 100% within 12 days (personal communication from 2013-03-20). Follow-up assessments were conducted six weeks and six months post-injury. At all three time points, PTSD symptoms, depression symptoms, and health-related quality of life were assessed (Kassam-Adams et al., 2011).

Children in the target intervention group were assessed for and participated in discussion relating to (1) current distress (PTSD or depression symptoms, pain, fears, and worries); (2) factors that hinder the child's support system (parental distress and family stressors); and (3) child or parental questions about medical treatment. Finally, written information was handed

out including tip sheets, workbooks, and information on post-injury medical care. Notably, acute stress symptoms were assessed and discussed as common reactions that many individuals experience transiently. However, parents and children were also educated about which types of reaction might be maladaptive and, therefore, require additional support (personal communication from 2013-03-20). Usually by telephone, session #2 was carried out an average of 22.9 days after session #1. Within a semi-structured brief interview, current symptomatology, support system, and follow-up medical care were discussed. If required and agreed upon, supplementary contact or additional services were arranged (additional contact with family, contact with medical providers, provision of a brief parent-child intervention, evaluation by a psychologist or psychiatrist, and trauma-focused cognitive-behavioral therapy for severe or persistent PTSD symptoms; Kassam-Adams et al., 2011).

Compared to standard medical care, the preventative intervention neither reduced PTSD or depression symptoms nor increased health-related quality of life.

It should be noted that a large proportion of eligible patients could not be contacted and that session #2 only occurred with about half of the participants in the target intervention group. With respect to eligible patients who could not be contacted, no data were collected so it remains unclear whether or not they might have profited from the intervention if so allocated. Moreover, only half of the participants in the intervention group received the complete intervention. Both limitations could have lowered the efficacy of the intervention.

It also was argued that the screening and baseline assessments might have aided both the parents and child by allowing them to discuss emotional reactions to the accident. However, although this is a well-known issue in randomized controlled intervention studies, the question remains as to whether it is even ethical or in fact advisable to omit the pre-treatment assessment among controls, as suggested by Kassam-Adams et al. (2011). Repeating the study with two control groups – one with and the other without any baseline assessment – would shed light upon this important issue. The authors also noted that 12 of the 13 children who had recently received mental health treatment were assigned to the target intervention. They recommended that, in future studies, this variable should be stratified. Either way, one could argue that recent mental health treatment is an indicator of pre-existing psychological problems and, therefore, a risk factor for the development of psychological problems after experiencing a major traumatic event. Hence, the disproportionate number of individuals who had recently received mental health treatment in the target intervention group could explain at least some of the lack of any detected treatment effect.

Table 16.
Characteristics of RCTs on secondary prevention (Abbreviation: + positive effect (in any outcome variable), = no effect (in any outcome variable), - negative effect (in any outcome variable), UI = unintentional injury, RTA = Road traffic accidents)

Authors, year	Number of participants	Age range (yrs)	Type of trauma	Type of intervention	Control group	Time point after trauma	Follow up	Theoretical basis	Number of sessions
Berkowitz et al., 2011	106	7 to 17	UI and interpersonal violence	Caregiver-Child Intervention (CFTSI)	Supportive comparison condition	Within 30 days	4 weeks from baseline assessment (up to 2 months) and 3 months	Cognitive and behavioral	4
Chapman et al., 2001	85	7 to 17	UI	Chapman Art Therapy Treatment Intervention (CATTI)	Standard hospital treatment	>1 week	1 week 1 month, 6 months, 1 year (if still symptomatic at 6 months)	Neuropsychological, art therapy, cognitive	1
Cox et al., 2010	56	7 to 16	UI	Web-based information	No intervention	2 to 3 weeks	4 to 6 weeks and 6 months	Cognitive and resilient theory	2-4 weeks of exposure before the first post-intervention assessment
Kassam-Adams et al., 2011	85	8 to 17	UI	Psycho-education and discussion of (1) current distress, (2) factors that hinder child's support system, and (3) child's/parent's question about medical treatment	Standard hospital services (not psycho-therapeutic)	As soon as possible (M=3 days, SD=2.8 days)	6 weeks, 6 months	Cognitive and behavioral	2
Schreier et al., 2005	57	7 to 17	UI	Chapman Art Therapy Treatment Intervention (CATTI)	Standard hospital services (not psycho-therapeutic)	12-24 hours	1, 6 and 18 months	Neuropsychological, art therapy, cognitive	1
Stallard et al., 2006	158	7 to 18	RTA	Debriefing	Neutral non-accident focused discussion	28 days	8 months	Debriefing	1
Zehnder et al., 2010	99	7 to 16	RTA	Cognitive-behavioral early intervention	No intervention	10 days	2 and 6 months	Cognitive and behavioral	1

Table 16.

Characteristics of RCTs on secondary prevention (Abbreviation: + positive effect (in any outcome variable), = no effect (in any outcome variable), - negative effect (in any outcome variable), UI = unintentional injury, RTA = Road traffic accidents) (continued)

Authors, year	Setting	Screening	Psycho-education on posttraumatic stress symptoms	Normalization of acute stress reactions	trauma reconstruction	Coping-skills	Social Support	Self-reported outcome variables	Reported outcome
Berkowitz et al., 2011	Child and caregiver separately as well as together	yes	yes	yes	no	yes	yes	PTSD symptoms, dissociation and anxiety	+ Significant time x group effects of PTSD and anxiety symptoms. Significant group differences in relation to re-experiencing and avoidance-symptoms
Chapman et al., 2001	Child alone	yes	no	no	yes	yes	no	PTSD symptoms	= no significant overall difference in patient's PTSD symptoms between intervention and control group. The intervention produced a reduction in avoidance symptoms at 1 week and sustained that decrease 1 month.
Cox et al., 2010	Written information for parents and children separately	no	yes	yes	Recommendation that children and parents talk about and reflect the accident	yes	yes	PTSD symptoms, dissociation, anxiety, depression, and anger	+ Significant time x group effects of anxiety: Decrease in the intervention group; increase in the control group.
Kassam-Adams et al., 2011	Child and parents	yes	yes	yes	no	yes	yes	PTSD symptoms, depression and health-related quality of life	= the preventive intervention did not reduce PTSD or depression severity or increase health-related quality of life, compared to usual care
Schreier et al., 2005	Child alone	yes	no	no	yes	yes	no	PTSD symptoms	= no significant differences between the intervention and the control group. Non lasting significant intervention effect concerning avoidance/numbing symptoms 1 month post-trauma
Stallard et al., 2006	Child alone	no	yes	yes	yes	yes	not mentioned	PTSD symptoms, anxiety, depression and behavior difficulties	= no significant group differences in all outcome variables
Zehnder et al., 2010	One session together with child and parent(s)	no	yes	yes	yes	yes	yes	PTSD symptoms, depression and behavior problems	+ significant group subgroup (7-11y) differences in depression and behavior at 6 months follow up

1.3.4.2 Summary

Overall, three of the seven studies detailed above yielded positive results for different outcomes (PTSD and anxiety: Berkowitz et al., 2011; anxiety: Cox et al., 2010; depression symptoms and behaviour problems: Zehnder et al., 2010). The remaining four studies failed to identify any significant treatment effects (Chapman et al., 2001; Kassam-Adams et al., 2011; Schreier et al., 2005; Stallard et al., 2006). However, it should be noted that, in none of the seven RCTs did the target intervention worsen symptoms. This is a remarkable finding as, in their meta-analysis on adults, Rose, Bisson, Churchill, & Wessely (2009) concluded that single-session individual psychological debriefings are ineffective at preventing PTSD, and one study even revealed deleterious effects (Rose et al., 2009).

The tested interventions in the seven reviewed RCTs included either one or several of the following elements: trauma reconstruction, psycho-education regarding PTSD symptoms, normalization of acute stress reactions, coping-skills, and social support (Table 16).

Direct exploration of the trauma is crucial in the psychotherapeutic treatment of children with PTSD (American Academy of Child and Adolescent Psychiatry, 1998). Nevertheless, only four studies on early treatment included trauma reconstruction. Even more surprising is that only one intervention that provided detailed trauma reconstruction was superior to the control condition (Zehnder et al., 2010). Thus, there seem to be differences in the mechanisms of recovery in the early aftermath of a traumatic event, relative to the subsequent time period. Consequently, it is questionable whether trauma reconstruction needs to be incorporated in early psychological interventions. This being said, the data demonstrated that early exposure to a traumatic event did not impede a child's recovery.

Furthermore, for the psychotherapeutic treatment of children with PTSD, the *American Academy of Child and Adolescent Psychiatry* (1998) suggests using specific stress management techniques. Accordingly, all RCTs on early interventions included the teaching of coping-skills. Nonetheless, under half of the studies identified beneficial effects (Berkowitz et al., 2011; Cox et al., 2010; Zehnder et al., 2010). Ultimately, based upon currently-published research, no firm conclusions on the effectiveness of stress management skills in early psychological interventions can be made.

It is well known that the post-trauma social environment is an important determinant of successful recovery (Trickey et al., 2012). In line with this, the *American Academy of Child and Adolescent Psychiatry* (1998) has suggested that parents be incorporated into the psychotherapeutic management of children with PTSD. Within the field of early psychological interventions, particularly in the four recently-published studies just discussed (Berkowitz et al., 2011; Cox et al., 2010; Kassam-Adams et al., 2011; Zehnder et al., 2010), parents were included in treatment sessions and encouraged and instructed families to socially

support their child. Three of these four RCTs yielded beneficial effects. Consequently, it is empirically valid to suggest that parents should be involved in early intervention and that social support should be facilitated.

All of the five RCTs which provided psycho-education on PTSD symptoms also normalized acute stress reactions (Berkowitz et al., 2011; Cox et al., 2010; Kassam-Adams et al., 2011; Stallard et al., 2006; Zehnder et al., 2010); but only three of these studies identified positive effects (Berkowitz et al., 2011; Cox et al., 2010; Zehnder et al., 2010). Weighing these disparate results on psycho-education and normalization of PTSD symptoms, no conclusions regarding the helpfulness of these elements can be drawn.

In their summary of the literature, Stallard and Salter (2003) concluded that early psychological interventions should take place only after a victim has recovered from the immediate shock of the trauma. The psychological 'numbness' that frequently occurs immediately after such an event might even have some adaptive function (Hobbs & Mayou, 2000). Congruently, Yule (1994) suggested an ideal time line of 7 to 14 days post-trauma (Chemtob, 2000). Interestingly, when judging the seven RCTs with regards to when the intervention was delivered, three (Berkowitz et al., 2011; Cox et al., 2010; Zehnder et al., 2010) of the four (Berkowitz et al., 2011; Cox et al., 2010; Stallard et al., 2006; Zehnder et al., 2010) interventions that were administered between one and four weeks post-event yielded beneficial treatment effects. These results are consistent with earlier suggestions that interventions should not be provided too early, as in within seven days of the traumatic event. Supplementarily, it should be noted that Stallard et al. (2006) failed to detect any benefits of their single-session intervention delivered as late as 28 days post-trauma. Hence, one might cautiously surmise that an early intervention also can be delivered too late to be effective.

Probably stemming from the concept of psychological debriefing, most studies only involved one intervention session, with only the two latest RCTs entailing more than one session (Berkowitz et al., 2011: 4; Kassam-Adams et al., 2011: 2). Despite this, only Berkowitz et at. (2011) found their intervention to be effective. One could argue that the larger number of sessions accounted for this positive finding, as more intense treatment might be expected to generate larger effects; however, further research is needed to confirm this assumption.

About half of the studies used screening to differentiate between individuals at high and low risk of long-term psychological maladjustment (Berkowitz et al., 2011; Chapman et al., 2001; Kassam-Adams et al., 2011; Schreier et al., 2005). However, among these studies, only one of the treatments delivered to those 'at risk' (Berkowitz et al., (2011) was beneficial. Nevertheless, because of the obvious economic benefits of this approach, screen-and-treat models likely should be used. For instance, research has demonstrated that only about one in ten children experience chronic trajectories after a traumatic event (De Young et al., 2011b:

8%; Le Brocque et al., 2010: 11%). This finding is independent of the outcomes of any early intervention and suggests that children at risk should be monitored more closely and potentially supported.

1.3.4.3 Conclusions

Although research on early psychological interventions in children and adolescents is scarce, the seven RCTs published in this area enable one to draw certain conclusions.

(1) Three studies revealed beneficial effects, whereas none of the remaining four studies demonstrated any deleterious effects. Thus, to some extent, early interventions in children may be helpful and likely do no harm. (2) There is some evidence that – contrary to psychotherapy – children do not profit from trauma reconstruction in the early aftermath of a traumatic event. (3) Although stress management skills were provided in all of the early interventions, beneficial effects were noted only in three. Hence, no conclusions should be drawn with respect to the helpfulness of coping-skills training. (4) There is promising evidence that parents should be involved in early intervention and that families should be encouraged and instructed to socially support their child. (5) With regards to psycho-education and the normalization of PTSD symptoms, study results were inconsistent. It therefore remains unclear whether these elements should be included in early interventions. (6) Current research points out that the ideal timing of early interventions might be between about one and three weeks post-trauma. (7) It is reasonable to expect that more sessions would lead to greater intervention effects than fewer sessions. However, given that in only one of the three studies identifying beneficial effects was more than one session provided, no conclusions can be drawn. Finally, (8) though only one study that incorporated risk screening to select eligible subjects ultimately yielded a positive effect of treatment, for economic reasons, it is recommended that screening is maintained.

In closing, certain warnings regarding the above-drawn conclusions and consequent suggestions for further research must be given. First, with only seven published RCTs, the body of evidence is still small. Hence, further qualitative research on this topic is desperately needed. Second, disentangling the effectiveness of single elements is confounded by the variety of elements included in the various studies, as well as by the few studies that identified positive effects. Consequently, more RCTs are needed that examine fewer interventional elements at a given time. For example, Cox et al. (2010) only provided written information and found significant time-by-group effects. This can be interpreted as supporting the delivery of written information without personal contact as a potentially effective intervention. Third, the effectiveness of studies was based on solely on whether or not statistically significant intervention effects were reported; some studies identified beneficial effects that did not reach the level of statistical significance. On the basis of effect sizes, such

results could be meaningful. Hence, a meta-analytic approach would be appropriate. Fourth, in this overview, only RCTs were examined. This is reasonable as RCTs are considered the gold standard in terms of testing the effectiveness of any intervention. However, in consideration of the fact that so few RCTs are available, a less conservative approach could also be deemed reasonable. For instance, controlled but non-randomized studies could be considered as well. To address the issue of study quality, a standardized quality rating could be used for studies, and ultimate conclusions rated formally in terms of the strength of evidence.

1.4 Indicated versus Universal Prevention

As mentioned earlier, current reports show that roughly 80-90% of children recover without outside help or are resilient after sustaining an injury (De Young et al., 2011b; Le Brocque et al., 2010). Thus, only a small proportion of traumatized children require psychological treatment. For these reasons, screen-and-treat models are reasonable that aim to reliably identify those children at high risk for long-term morbidity and offer appropriate further treatment. Besides the clinical relevance of such a process, the economic advantages are obvious.

In the 1990s, for the first time, screening instruments were used to identify PTSD in children (Saylor, Swenson, Reynolds, & Taylor, 1999; Stallard, Velleman, & Baldwin, 1999; Yule & Udwin, 1991). These questionnaires did not strive to predict the risk of developing PTSD; rather, they measured prevailing PTSD. Mostly, the *Children's Revised Impact of Event Scale* (8) (CRIES-8; Children and War Foundation, 1998) was used. The CRIES was recently evaluated concerning its prospective validity in a sample of 63 children ages 10 to 16 years old (Perrin, Meiser-Stedman, & Smith, 2005). Over a follow-up period of six months, sensitivity was 100%, a positive screen correctly identifying all seven individuals with a persistent diagnosis of PTSD. Specificity was 71%. Notably, however, the CRIES was not evaluated as an early screening instrument.

To date, three early screening instruments for the prediction of both full and partial PTSD in school-age children are available (TSQ/10: Kenardy, Spence, & Macleod, 2006; STEPP-AUS: Nixon, Ellis, Nehmy, & Ball, 2010; STEPP: Winston, Kassam-Adams, Garcia-Espana, Ittenbach, & Cnaan, 2003). Validation of these measures was performed in samples consisting of a variety of injuries, like road traffic accidents, burns, falls, and dog bites. For pre-school children, no formally-evaluated early screening instrument is yet available.

The *Child Trauma Screening Questionnaire* (CTSQ; Kenardy et al., 2006) contains 10 dichotomous questions that are asked of the child. Only trauma-related characteristics are

assessed. Half of the items assess re-experiencing and hyper-arousal symptoms. The best predictive power at six months of follow-up was achieved using a threshold value of 5. Using this threshold score, sensitivity and specificity were 82% and 74%, respectively; meanwhile, PPV was low (23%), while NPV was excellent (98%).

The *Screening Tool for Early Predictors of PTSD* (STEPP; Winston et al., 2003) enables one to predict the development of PTSD in children ages 8 to 17 years, as well as in their parents. The STEPP encompasses 12 dichotomous items, among which only four are asked of the child and parent. The remaining items are answered by consulting medical records. The assessed risk factors include individual (i.e., age, gender or pre-existing conduct problems), trauma-related (i.e., heart rate during triage in the emergency department), cognitive (i.e., thoughts that they might die), and environmental characteristics (i.e., the presence of parents during the child's accident or in the ambulance/helicopter; parental feelings of helplessness). At three to 13 months of follow-up (M=6.5 months; 93% within 9 months), sensitivity, specificity, PPV and NPV were 88%, 48%, 25% and 95%, respectively. Test-retest reliability was excellent in children ($r_{tt=}$.86) and good in parents ($r_{tt=}$.67).

Nixon et al. (2010) designed an *Australian version of the Screening Tool for Predictors of PTSD* (STEPP-AUS). For that purpose, from the STEPP's (Winston et al., 2003) original pool of 50 items, they derived four dichotomous items for the child and the same number for the parents. Mainly individual (i.e., pre-existing psychological problems) and trauma-related characteristics (i.e., dissociation and hyper-arousal) were assessed. The sample consisted of ninety 7 to 17-year old children and their parents. The predictive power for the 6-month follow-up was comparable to that of the STEPP: sensitivity and specificity were 89% and 69%, respectively; PPV and NPV 24% and 98%. The internal consistency was low, however, with α=.54.

Table 17.
Predictive performances of the STEPP, STEPP-AUS, and CTSQ

	Screening measure		
	STEPP	STEPP-AUS	CTSQ
Sensitivity	0.88	0.89	0.82
Specificity	0.48	0.69	0.74
Positive Predictive Value	0.25	0.24	0.23
Negative Predictive Value	0.95	0.98	0.98

Table 17 shows how the three presented screening measures are quite comparable with regards to their predictive performance. However, the STEPP's (Winston et al., 2003) specificity is considerably lower, resulting in roughly half of the children who would not need any intervention being treated anyway. However, as this is largely an economic issue, such a screening measure can still be considered effective, given that its sensitivity is high.

1.5 Aims and Hypotheses

1.5.1 Conclusions from previous Research

As shown above, mental trauma is not limited to adults, but common among school-age and pre-school children. Likewise, children can experience psychological consequences after any major traumatic event. However, not all children suffer from psychological sequelae. Moreover, the majority of children is either resilient or recovers without any outside help. Thus, both risk and resilience factors play an important role in the recovery process. Nevertheless, a significant number of children suffer from a chronic course that does not remit over years. For these children, it is crucial that post-traumatic symptoms be detected as early as possible so the child can be provided with secondary preventative support. However, despite nearly three decades of research on secondary prevention in children, the body of research remains scarce. The most obvious advances have been achieved concerning the individualization of early help; soon after the appearance of group debriefings – which were provided to all individuals affected by a traumatic event – a shift was made towards individual sessions. Where initially trauma-reconstruction and emotions and cognitions were central, these elements were completed with coping-strategies more directed towards stress symptoms. The individualization process advanced even more with the identification of those children at particularly high risk for long-term psychological maladjustment. Further advances have been expanding the setting and including parents; the focus of traumatic event was transferred to each child's most private environment. Hence, the parent-child relationship became a crucial element of secondary intervention. Notably, this research primarily targeted school-age children. A major lack of evidence exists for younger children, with secondary prevention for pre-school children barely studied at all.

1.5.2 Aims, Research Questions, and Hypotheses

The general objective of this thesis is to contribute to the growing, but still fragmentary body of evidence on secondary prevention in children after a single traumatic event. To achieve this, this study has the following four specific aims:

1. To conduct a systematic, comprehensive, qualitative, and quantitative review of the state of research on secondary preventative interventions in children; to date, no literature review adopting a meta-analytic approach has been published.
2. To create a secondary preventive intervention for children, drawing from previous research.
3. In order to embed this intervention within a stepped care model where only children at high risk for long-term psychological maladjustment are provided with psychological support, powerful and reliable screening tools are required. While for school age children

some successfully evaluated tools are available, for pre-school children no such instruments are on hand. Thus, this project's third objective is to design and evaluate an early screening measure for pre-school children.
4. Finally, to evaluate the early intervention mentioned in Aim #2 within the context of a randomized-controlled trial.

These aims, in turn, lead to the following research questions:

Based upon already-published studies:

1. What are the magnitude and direction (positive vs. negative) of effect sizes for early psychological interventions in children after a single traumatic event?
2. Which elements of early psychological interventions are helpful in children after a single traumatic event?

Based upon my own collected data:

3. Which – if any – of the selected risk factors reliably identify pre-school children at risk for later PTSD?
4. Does the proposed early psychological intervention improve pre-school and school-age children's psychological adjustment, relative to that received by children randomly allocated to a control arm who are not offered any early psychological intervention.

Based upon the overview of current research and the formulated research questions, the following hypotheses were formulated[4]:

1. The early screening measure for pre-school children will display high sensitivity and moderate specificity.
2. Both behavior-related predictors and additional risk factors (child and parent pre- and post-accident characteristics) will contribute to the early screening instruments good predictive performance.
3. School-age children who receive the early psychological intervention will suffer from fewer PTSD and depression symptoms and will display fewer behavioral problems, relative to children not offered early psychological intervention.
4. Pre-school children who receive the early psychological intervention will suffer from fewer PTSD symptoms and will display fewer behavioral problems relative to children not offered early psychological intervention.

[4] Conducting a literature review, one is interested in a comprehensive, not yet available overview of study results with regards to a specific topic. Consequently, no hypotheses can be formulated.

1.6 The EPICAP Intervention

1.6.1 Overview

The Early Psychological Intervention for Children and Parents (EPICAP) is further development of the single-session intervention evaluated by Zehnder et al. (2010). Amendments were made mainly based on the results of Zehnder et al.'s (2010) RCT. Consequently, the intervention was modified with regards to two aspects: First, two sessions instead of one were administered. Second, the trauma narrative was adapted to be more age-appropriate. Notably, the concept of three modules was maintained. Thus, detailed reconstruction of the accident (module 1), orally and written information on acute stress symptoms and general age-dependent coping strategies (module 2), and information on individual coping strategies (module 3) were provided. Modules 1 and 2 were included within the first and module 3 within the second session, two weeks after session #1 (Figure 8).

In order to ensure standardization, the EPICAP intervention was manualized separately for the three age-groups: 2 to 6, 7 to 11, and 12 to 16 years.

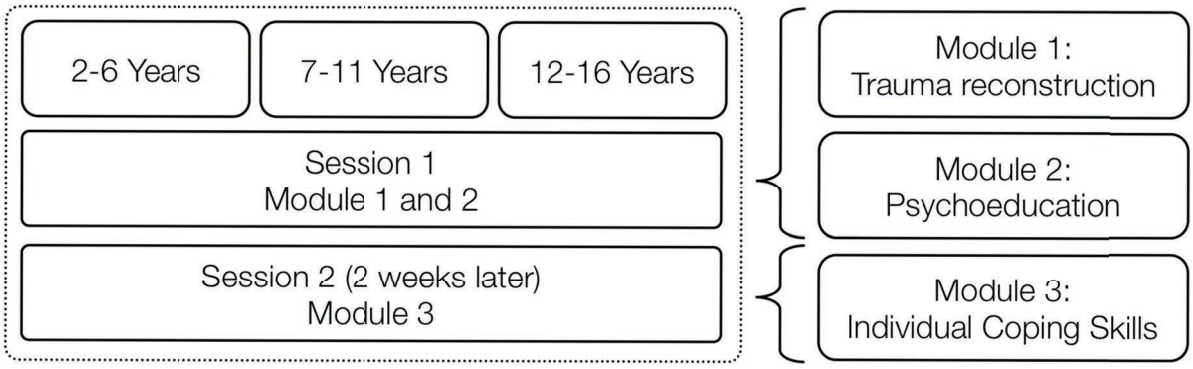

Figure 8.
Modules in the Early Psychological Intervention for Children and Parents (EPICAP)

1.6.2 Trauma Reconstruction

Mentally re-visiting the trauma is essential for the effective treatment of PTSD (Cukor, Olden, Lee, & Difede, 2010). However, different theories on how to do this have been formulated. In the following sections, the two most prominent theories are presented and ultimately compared. Concluding thoughts and implications for trauma reconstruction in the early post-trauma setting and for the EPICAP intervention are given.

1.6.2.1 Cognitive Learning Theory

Nearly three decades ago, Mowrer's (1960) *two-factor learning theory* was used to explain the PTSD symptoms of fear and avoidance. The first factor – *classical conditioning* –

explains how a neutral stimulus becomes a conditioned one by its association with an aversive unconditioned stimulus via temporal contiguity. Because the conditioned stimulus becomes aversive, it has the potential to act as an unconditioned stimulus. This presents the basis for stimulus generalization. The second factor – *instrumental conditioning* – explains how avoidance as learned behavior decreases the aversive feeling and, therefore, is maintained. Consequently, avoidance prevents the negative feelings that were produced by the conditioned stimulus from diminishing over time. The symptoms become chronic. This model was supplemented using the cognitive components of expectation, attribution and appraisal (Foa, Steketee, & Rothbaum, 1989). The central role of cognition for the development and maintenance of PTSD is illustrated in Ehlers and Clarke's (2000) well-examined cognitive model (see 1.2.3.1) (Landolt, 2012).

Based upon *cognitive learning theory*, psychotherapy concepts like *trauma-focused cognitive-behavioral therapy* (tf-CBT; Cohen, Mannarino, & Deblinger, 2009) and *prolonged exposure therapy* (PE; Foa, Hembree, & Rothbaum, 2007) have been developed. A core element of these programs is the *in sensu* or *in vivo* exposure of the patient to the traumatic event, so he or she sees how the evoked fear diminishes over time. This process of *habituation* is explained via extinction of the conditioned stimulus while the conditioned stimulus is no longer succeeded by an aversive reaction (Foa et al., 1989).

Additionally, Foa et al. (1989) emphasized how, during exposure, the memory's fear structure – including information on the situation, affect and cognition – must be reactivated for change to occur. Thereto, emotions must be evoked for a new memory to be formed. Dysfunctional cognitions are either indirectly corrected by experiencing how fearful assumptions do not emerge during exposure (Foa et al., 1989) or directly by being addressed and discussed after the exposure (Cohen et al., 2009).

1.6.2.2 Neurocognitive Memory Theory

Neurobiologic and cognitive theories explain the development of PTSD by pathologic memory representations of the traumatic event (Neuner et al., 2008). An overwhelming, traumatizing event can distort the interplay between autobiographical representations (context information about "what, "where", and "when") and sensory-perceptual representations (sensory and emotional information). Catecholamines (norepinephrine and epinephrine) have an immediate effect upon the sympathetic nervous system, which leads to a fight-or-flight response. Somewhat later, corticotropin is secreted by the pituitary gland, causing the release of the stress hormone cortisol from the adrenal cortex (Neuner et al., 2008). Cortisol impacts a series of mechanisms, such as metabolism, the immune system, and brain functioning (Landolt, 2012). As a result, among other changes, blood sugar levels increase and the hippocampus – a crucial brain structure for the modulation of memory and consolidation – is

affected. After an initial rise in hippocampal activity – as soon as a certain threshold is exceeded – its activity decreases dramatically. Persistently high levels of cortisol (caused by chronic stress) result in severe impairment in hippocampal function. By contrast, similarly triggered by stress hormones, amygdala activity increases. Additionally, the medial prefrontal cortex – which normally inhibits amygdala activity – becomes less active. The just-described reactions of the hippocampus, amygdala and prefrontal cortex directly impact memory representations: on one hand, impaired hippocampal function leads to the fragmented storage of autobiographical information. On the other hand, the increased activity of the amygdala creates a large and strongly cross-linked fear network that can be triggered easily by a variety of stimuli. These characteristics of trauma memory explain the PTSD symptoms summarized by incoherent autobiographic representations and an easily-triggered emotional and sensory network (Neuner et al., 2008).

Neurocognitive memory theory implies that therapy should focus on the re-organisation of the fragmented trauma memory. As the autobiographical information is inevitably connected to the highly emotional and sensorial representations, involvement of these strong sensations is important for therapy. Via the use of systematic narration, the patient's trauma memory should be coherently reorganized. This enables the prefrontal cortex to increasingly inhibit the emotional fear reactions caused by the amygdala. Thus, habituation of the emotional response is achieved (Neuner et al., 2008).

1.6.2.3 Comparing Cognitive Learning Theory and Neurocognitive Memory Theory

One may ask to what extent cognitive learning theory and neurocognitive memory theory differ, as both include exposure, cognition, and trauma narration. Although recent cognitive behavioral theories include trauma narration, it can be claimed that, theoretically, in cognitive behavioral therapy, the trauma narrative is a means to an end. This can best be seen during *in vivo* exposure, where the non-verbal experience is clearly in the foreground. Affirmatively, a recent study in 4 to 11-year old sexually-abused children suggests that reliving minimal, implicit trauma in the framework of tf-CBT is equally effective with and without an explicit trauma narrative (Deblinger, Mannarino, Cohen, Runyon, & Steer, 2011). By contrast, narrative exposure therapy is impossible with no explicit verbal narration.

Besides these conceptual differences, the underlying mode of action can only be speculated. Neuner et al. (2008) point out that, whereas exposure therapy originally was based upon fear extinction, recent findings suggest that constructing autobiographic knowledge is crucial. To some extent, cognitive and 'mere' exposure therapies might include narration – albeit only implicitly and unstructured. Conversely, narrative exposure therapy also includes cognition. These components are highly inter-correlated and hardly separable. Interestingly, a variety of trauma therapies that emphasize either of these treatment elements have been found to be

equally effective (e.g. tf-CBT, EMDR, KIDNET; Landolt & Hensel, 2012). Hence, irrespective of where a treatment mainly applies, other mental components seem to be involved as well. Nevertheless, research on the relative effects of the involved components is lacking (Landolt & Hensel, 2012).

1.6.2.4 Implications for Trauma Reconstruction in the Early Setting

Because mentally reliving trauma is crucial to trauma therapy, it seems likely that this might be the case for early psychological interventions as well. Nevertheless, some aspects concerning the early aftermath of a traumatic event must be respected. For instance, some strategies that later may be dysfunctional can be self-protective immediately after a traumatizing event (e.g., psychological "numbness" might have some adaptive function, Hobbs & Mayou, 2000; avoidance or thought suppression might protect the victim from overwhelming emotions, Kazak et al., 2006). Consequently, such coping behaviors should not immediately be challenged. In accordance with this, trauma reconstruction in the EPICAP intervention was conducted with regards to contextual autobiographical information, while omitting emotions. This procedure is supported by findings suggesting that incomplete trauma memory has a large impact on the initial development of PTSD (Stallard & Smith, 2007). However, for the persistence of PTSD symptoms, dysfunctional cognitions are more important (Stallard & Smith, 2007). Additionally, emotional re-experiencing is necessary to restructure an already consolidated trauma memory. By contrast, constructing a functional trauma memory in the early aftermath of a traumatic event is reasonably supported by the provision of adequate and comprehensive context information.

1.6.2.5 Trauma Reconstruction Modules in the EPICAP Intervention

In module 1 of the EPICAP intervention, trauma reconstruction was performed in an age-appropriate manner: while children ages 2 to 11 years reconstructed the accident with Playmobil toys (Appendix 1 and Appendix 2), the material for adolescents ages 12 to 16 years was complemented and partially replaced by less childlike toys; for example, small model cars or simple wooden figures (Appendix 3 and Appendix 4). Children younger than seven years old were rigorously supported by their caregivers during trauma reconstruction.

1.6.3 Psycho-education and Coping-skills

Early concepts of psycho-education (e.g. Anderson, Hogarty, & Reiss, 1980) were based upon behavioral therapeutic concepts that include information provision about the disorder as well as training in different coping-skills (Bäuml, Froböse, Kraemer, Rentrop, & Pitschel-Walz, 2006). Originally, psycho-education aimed at reducing relapse rates (mainly for patients with schizophrenia), preventing re-hospitalization, enhancing patient adherence to treatment and the degree of the illness' cognitive mastery, as well as family members' tolerance of the

psychopathology (Hayes & Gantt, 1992). Still in line with this view, Bäuml et al. (2006) recently presented Grawe, Donati, & Bernauer's (2004) three fundamental dimensions of psychotherapeutic work as the basis of psycho-education: *therapeutic relationship*, *causal*, and *control attribution*.

Most consider a *therapeutic relationship* necessary for any therapeutic intervention to be provided successfully. Accordingly, such relationships are considered crucial to psycho-education programs (Wood, Brendtro, Fecser, & Nichols, 1999). *Causal attribution* clarifies the background of the disorder and its impact upon the patient's behavior (Bäuml et al., 2006). Insights into possible biological and biochemical causes might help to diminish the relevance of dysfunctional cognition of guilt and blame (Hayes & Gantt, 1992), which are known to contribute to the development of posttraumatic stress symptoms (Ehlers & Clark, 2000). Furthermore, via enhanced knowledge about possible stress symptoms and receiving the message that, for most individuals, these symptoms are in the context of a normal and transient stress reaction, an individual may find their present symptoms less distressing (Wessely et al., 2008). Being aware of the presence and nature of stress reactions also may increase the likelihood that people seek help (Wessely et al., 2008). Finally, in order to influence *control attribution*, practical knowledge about the disease and how it is treated is taught (Bäuml et al., 2006). The former aims to augment coping competence, where behavioral therapeutic techniques will dominate (Bäuml et al., 2006). The latter may facilitate a patient seeking further help (Wessely et al., 2008) or enhance adherence to treatment (Hayes & Gantt, 1992).

Coping competence may act in two ways: (1) It helps in the efficient handling of stress symptoms and situations. (2) In turn, the efficient handling of stressors may enhance an individual's sense of self-efficacy. Just recognizing that one has the capability to handle stressors efficiently could already be sufficient to reduce perceptions of stress.

Per Antonovsky's (1987) salutogenetic *theory of sense of coherence*, it can be summarized that psycho-education can provide the information necessary to attain a higher sense of coherence, which is defined by the three components *comprehensibility*, *manageability*, and *meaningfulnesss* (Landsverk & Kane, 1998). *Comprehensibility* refers to the extent that present and future external and internal stimuli make sense and are predictable to the individual. *Manageability* refers to how effective an individual can handle a given stimulus. Finally, *meaningfulness* can be considered the emotional and motivational component of comprehensibility (Landsverk & Kane, 1998).

Although information provision and training in coping-skills should be considered separate therapeutic elements, it is obvious that the latter is a reasonable consequence of the former.

Consequently, with the EPICAP intervention, coping-skills were provided separately but based upon the preceding psycho-education on acute stress symptoms.

Table 18.
Pattern to guide the assessment of prevailing acute stress symptoms in three areas of a child's daily life

Symptoms / situation	Intrusion	Avoidance	Hyper-arousal
Family / home			
School			
Friends			

During the first session in module 2 of the EPICAP intervention, information on acute stress symptoms and general coping-skills was provided orally and in written form (Appendix 5 and Appendix 6). Throughout the second session, individual coping strategies were discussed. For that purpose, first, difficulties associated with trauma-related symptoms (intrusion, avoidance, and hyper-arousal) in the three principle areas of the child's daily life (family/home, school, and friends) were collected and prioritized (Table 18). Predominant trauma symptoms were assessed by presenting a series of illustrations to the child (Appendix 7 and Appendix 8). Secondly, with regards to present trauma symptoms, adequate standardized coping-skills (e.g., relaxation skills or fear-facing strategies) were proposed and practiced with the child.

1.7 Study Procedures

Learning from study results obtained by Zehnder et al. (2010), amendments were done regarding both the sample and procedure. First, because a significant number of children do not recover after a burn injury (Graf et al., 2011; Landolt et al., 2009a), the sample was extended to this type of accident. Second – given that no studies on early psychological interventions in pre-school children exist, despite the fact that these children also suffer from long-term psychological maladjustment after a single traumatic event – children ages 2 to 6 years were included. Third, knowing that the majority of individuals after a single traumatic event recover without any outside help, the study followed a screen-and-treat stepped procedure, only including children deemed to be at high risk.

Finally, the effectiveness of the EPICAP intervention was evaluated within a randomized controlled study (Figure 9). Within the first 7 to 10 days after the accident, screening to estimate the risk of developing PTSD was done to divide otherwise eligible individuals into high and low risk groups. Participants at low risk were excluded from the intervention study, but reassessed six months after their accident to validate the screening instrument. Following the baseline assessment carried out within 10 to 14 days of the accident, participants at high risk were randomly assigned to receive either the target intervention or standard medical care.

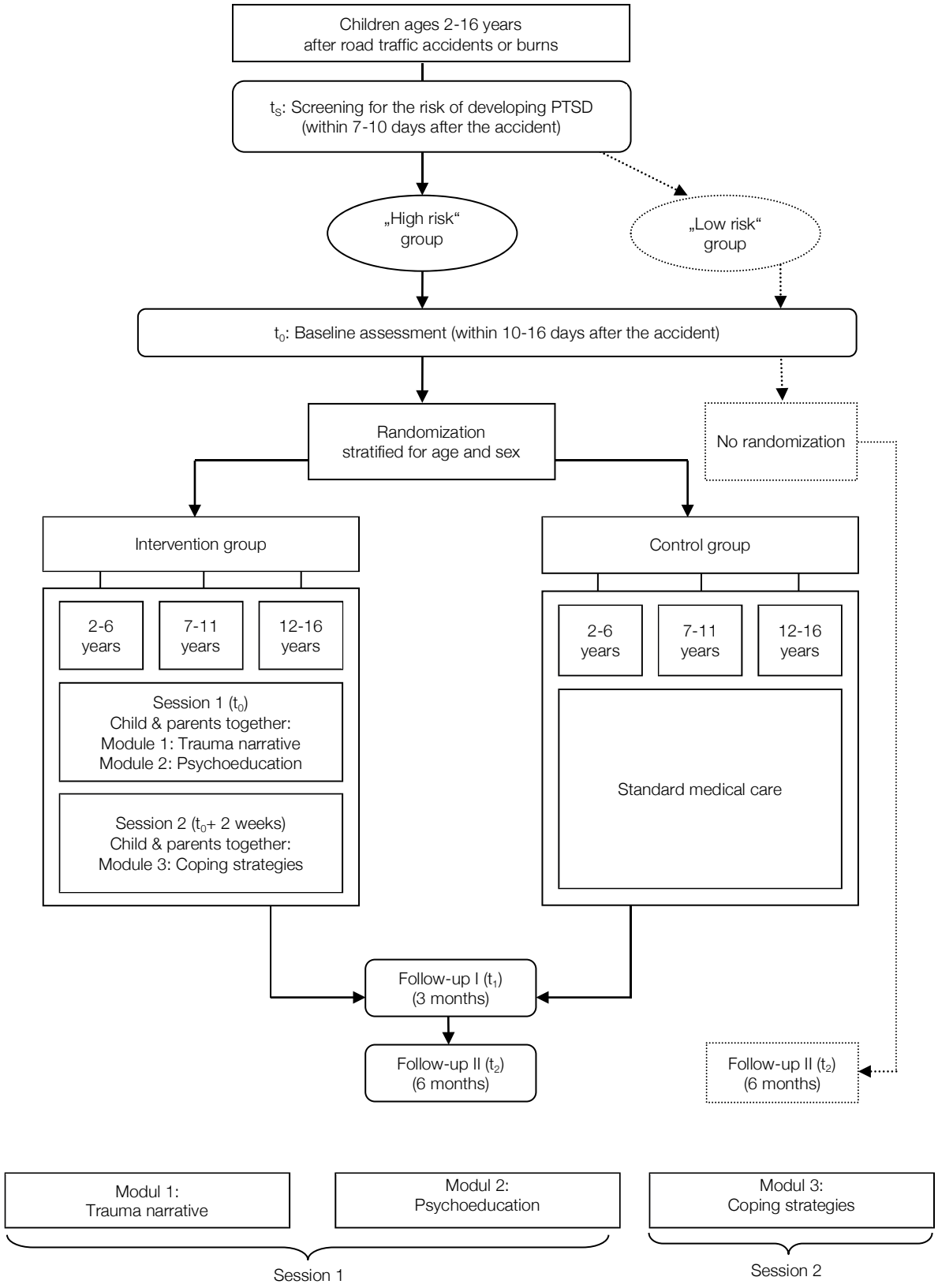

Figure 9.
Randomized controlled trial design of the study

Children in the target intervention group received EPICAP. Children in both groups were reassessed by blinded evaluators three and six months post-accident.

The assessment of outcomes included measures of PTSD, depression, and behavior (for details, see Section 1.8).

To predict post-hoc which characteristics influence the primary outcome variables, several predictor variables were measured related to school, health, and therapy received, as well as to the parents' stress symptoms, somatic and mental health, and socio-economic status, and the child's and parents' subjective appraisal of the accident and the mother's level of stress during pregnancy. Complementary variables to assess the quality of family relationships were examined, as well as possible life events and medical data (the type and severity of the accident and injury, number of operations, and duration of hospitalization).

1.8 Measures used in the PICARTA-B Study

1.8.1 Screening Measures

1.8.1.1 Additional Risk Factors

For both school-age and pre-school children, the parents were asked to rate five additional risk factors that were selected in accordance with current literature. Due to very limited evidence available on pre-school children (De Young et al., 2011b), findings in school-age children had to be extrapolated to select presumed-relevant risk factors (Appendix 13): (1) pre-morbid behavioral difficulties in the child (De Young et al., 2011b); (2) pre-morbid chronic mental (De Young et al., 2011b) or physical (Houck, Rodrigue, & Lobato, 2007) illness in the parent; (3) pre-traumatic life events in the family (Trickey et al., 2012); (4) parental feelings of guilt (Bakker et al., 2010); and (5) parental posttraumatic stress (De Young et al., 2011b). Parents had to rate risk factors 1 and 2 dichotomously (*yes*/*no*), while factors 3 through 5 were judged on 4-point Likert scales, ranging from 0 (*no effect*) to 3 (*large effect*), with regards to the current effect of the problem on the family's or parent's life. An answer was deemed positive when the current effect was rated no less than *"moderate"* in magnitude (2).

1.8.1.2 School-age Children

For school-age children in the PICARTA-B study, the German version of the *Child Trauma Screening Questionnaire* (CTSQ; Kenardy et al., 2006), the *Trauma-Screening-Fragebogen für Kinder* (TSK/10; Haas & Goldbeck, 2010) was used, with a cut-off score of ≥5 (for details, see Section 1.4). In the final sample, internal consistency was α=.65, which is comparable to the consistency value (α=.69) reported by Kenardy et al. (2006).

The child had to answer two additional questions:

(1) Did you think the accident was your fault? (*yes*/*no*)
(2) When you were injured – or right afterwards – did you think that you might die? (*yes*/*no*)

If a positive response was given (*yes*), the child had to rate his or her current level of distress on a 4-point Likert-scale: *not distressing* (0), *a little distressing* (1), *rather distressing* (2), *strongly distressing* (3).

The child was classified as being at high risk under the following conditions:

(a) Either one of the additional risk factors asked of the parents was identified (1.8.1.1);
(b) Either one of the two additional questions asked of the child was answered *affirmatively* and the associated distress score was ≥2; or
(c) The CTSQ cut-off score of 5 was either equaled or exceeded.

1.8.1.3 Pre-school Children

The *Pediatric Emotional Distress Scale* (PEDS; Saylor et al., 1999) was originally developed to estimate child behaviors that occur significantly more often after a traumatic event. This parent report consists of 17 general behavior items and four trauma-related questions, with response options provided on a 4-point Likert response scale (0-3). These 21 questions were derived by expert opinion from an item pool and four DSM-III (American Psychiatric Association, 1987) criteria. In a sample of 475 two to ten-year old children (with and without prior exposure to a traumatic event), factor analyses revealed three factors — *anxious/withdrawn*, *fearful*, and *acting out* — to have acceptable reliabilities of α=.74, α=.72 and α=.78, respectively. Traumatized children had experienced various traumatic events, including sexual abuse and being in a hurricane. The overall internal consistency was α=.85. Discriminant analyses were used to determine maternal education sensitive cut-off scores. These cut-off scores were able to correctly identify 78% of children as having experienced a traumatic event, with false positive and false negative rates of 9.5% and 12.5%, respectively. Notably, only the 17 general behaviors were included in both the discriminant and reliability analyses, because the study included both traumatized and non-traumatized children; as such, non-traumatized children could not rate trauma-related items. An assessment of concurrent validity revealed significant correlations between the overall PEDS score and the total behavioral problem score of the *Eyberg Child Behavior Inventory* (ECBI; Eyberg & Ross, 1978; r=.62, p<.001), as well as between the total PEDS score and PTSD level measured using the *Reaction Index* (RI, Frederick, 1985; r=.62, p<.001). However, as the PEDS was not

administered in the early aftermath of a traumatic event, it was not evaluated as an early screening instrument. Neither was predictive performance ever estimated.

For the PICARTA-B study, the original PEDS items were adopted from the German consensus version, unmodified. Nevertheless, in order to measure reactive symptoms and not pre-existing conduct problems, the phrasing of the 4-point Likert scale was altered to change sensitive wording into: *Equal or less often* (0), *a little more often* (1), *much more often* (2), *very much more often* (3). By adding the values of each of the 21 items together, a summation score was computed, ranging from zero to 63. A threshold score of ≥15 was used. This new screening instrument was called the PEDS-Early Screener (PEDS-ES; Appendix 12). For the final sample, Cronbach's α was acceptable (α=.76).

A pre-schooler was classified as being at high risk for the development of PTSD if either one of the additional risk factors asked of the parents was identified (1.8.1.1), or if the PEDS-ES threshold score of 15 was either equaled or exceeded.

1.8.2 Posttraumatic Stress

1.8.2.1 Acute Stress Checklist for Children (ASC-Kids)

The *Acute Stress Checklist for Children* (ASC-Kids; Kassam-Adams, 2006) is the first self-report questionnaire explicitly developed for children and adolescents to assess acute stress symptom severity and ASD utilizing DSM-IV-TR criteria (American Psychiatric Association, 2000). The ASC-Kids contains 29 items. Nineteen of these items (5-23) comprise the ASC-Kids symptom scale. For this scale, a maximum of 33 points is possible. In one evaluation study, 176 children between the ages of eight and 17 completed the questionnaire one month after a traumatic injury or intensive care unit admission. The level of internal consistency was good for both the symptom scale (Cronbach's α=.85) and overall questionnaire (Cronbach's α=.86). A 4-factor structure (dissociation, intrusion, avoidance, and anxiety/arousal) explained 40% of the symptom scale's variance (Kassam-Adams, 2006).

A German version, the *Checkliste zur Akuten Belastung* (CAB; Frühe, 2007), was derived from the ASC-Kids. The CAB provides 26 items assessing ASD symptoms and 13 items examining a variety of risk and protective factors. All items are rated on 3-point Likert scales (0-2), and can be used to diagnose ASD as per DSM-IV-TR criteria (American Psychiatric Association, 2000). A symptom was deemed present when the Likert rating given for the corresponding item was the maximum value of two. Alternatively, if two items within a symptom cluster received response ratings of one, they were combined and counted as a single symptom. Given an internal consistency of α =.82 and factor analysis demonstrating 47.3% of the variance explained by five factors, the psychometric properties of the German

version can be considered comparable to those of the original English version (Fruhe, Kultalahti, Rothlein, & Rosner, 2008).

For the PICARTA-B study, the 26 items for ASD symptoms were used. Out of the CABs additional items on risk and protective factors, #10 („Do you think you should have acted in another way during the accident?“) and 11 („Do you think you could have prevented the accident in any way?“) were included as well. Since the DSM-IV-TR (American Psychiatric Association, 2000) criteria also include hyper-arousal (E6), this item was added.

ASD severity was computed by summing item scores (0-2). In accordance with Bryant & Harvey (2002), subsyndromal ASD was defined as three out of the four symptom clusters present, as per criteria requirements. ASD was diagnosed using DSM-IV symptom clusters A to G. In the final sample, internal consistency was good (α=.87)

1.8.2.2 Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA)

The *Clinician-Administered PTSD Scale for Children and Adolescents* (CAPS-CA) is currently considered the gold standard for diagnosing PTSD in eight to 18-year old children and adolescents (Nader et al., 2002). The CAPS-CA and its German translation, the *Interview zur Posttraumatischen Belastungsstörung bei Kindern und Jugendlichen* (IBS-P-KJ; Steil & Füchsel, 2006), are based on DSM-IV-TR criteria (American Psychiatric Association, 2000) and therefore allow for PTSD to be diagnosed (Landolt, 2012). Symptom frequency and intensity are rated on 5-point Likert scales (0-4) that included an illustrated face icon (sequentially, from very sad to very happy) for each response option. This allows for the calculation of overall symptom severity and for the evaluation of isolated symptom clusters. A symptom is considered present if its frequency is scored ≥1 and intensity scored ≥2. Finally, the children are asked about any impairments in function (Nader et al., 2002; Steil & Füchsel, 2006). Studies on the instrument’s psychometric properties have demonstrated satisfactory to very good reliability and validity (Landolt, 2012).

PTSD symptom severity was calculated by summing the IBS-P-KJ’s scores for frequency (0-4) and intensity (0-4). According to Bryant & Harvey (2002), subsyndromal PTSD was defined as two out of the three symptom clusters present. PTSD was diagnosed according to DSM-IV symptom clusters A to F. For the final sample, Cronbach’s α values were excellent (α=.95 at T1 and α=.94 at T2).

1.8.2.3 PTSD Semi-structured Interview and Observational Record for Infants and Young Children (PTSDSSI)

The *PTSD Semi-structured Interview and Observational Record for Infants and Young Children* (PTSDSSI, Scheeringa & Zeanah, 2005) is today’s method of choice to assess PTSD

and PTSD severity in pre-school children. Irblich (2006) translated the PTSDSSI into German, in accordance with international guidelines (Mallinckrodt & Wang, 2004). The PTSDSSI is the result of Scheeringa's studies on the adequacy of the DSM-IV-TR criteria (American Psychiatric Association, 2000) identifying PTSD in pre-school children (Scheeringa & Zeanah, 2001; Scheeringa et al., 1995; Scheeringa et al., 2003). As discussed earlier, proxy-reported criteria for PTSD in pre-school children need to be objective, because the child's subjective experience can neither be observed nor queried. The latter would exceed the child's cognitive and linguistic developmental abilities. Consequently, this measure contains all of the original DSM-IV PTSD criteria (American Psychiatric Association, 2000), as well as additional, developmentally more appropriate wording for five items (recollections, flashbacks, diminished interests, detachment and irritability; Scheeringa & Zeanah, 2001; Scheeringa et al., 1995; Scheeringa et al., 2003).

The PTSDSSI is already applicable for children only a few weeks of age. However, as a diagnostic instrument, it serves only from the age of nine months to about six years (Graf, Irblich, & Landolt, 2008). This measure enables a diagnosis that corresponds both to the DSM-IV-TR (American Psychiatric Association, 2000) and alternative criteria (Scheeringa, Zeanah, Myers, & Putnam, 2005). For the latter, the A2 criterion is not needed; and for the avoidance/numbing criterion, only one item is required (Scheeringa et al., 2005).

It is recommended that the child is present during the semi-structured interview. In so doing, the interviewer's non-standardized observations of the child can amend the primary caretaker's answers. Furthermore for the German version, Graf et al. (2008) suggested that the interviewer should study the English coding manual (Scheeringa & Zeanah, 2003).

To date, no studies have been published on the psychometric properties of the German version (Graf et al., 2008). Nevertheless, the predictive power and construct validity of the English version are assured (Scheeringa & Zeanah, 2001; Scheeringa et al., 1995; Scheeringa et al., 2003). Content validity also is presumed, as the criteria were formulated in very close adherence to the DSM-IV-TR (American Psychiatric Association, 2000) criteria (Graf et al., 2008). Inter-rater reliability and validity are good (Scheeringa et al., 2001; Scheeringa et al., 2003, 2005).

1.8.3 Child Behavior

Originally, the *Child Behaviour Checklist* (CBCL) was developed by Achenbach (1991) for children and adolescents ages four to 18 years old. It is part of the Achenbach System of Empirically Based Assessment (ASEBA). Besides the CBCL 4-18 for school-age children, the following ASEBA questionnaires are available in the German language: for school-age children, the Teacher Rating Form (TRF) and Youth Self-Report (YSR); and for pre-school children, the Caregiver-Teacher Rating Form (C-TRF 1½-5) and the CBCL 1½-5. Both the

CBCL 4-18 and CBCL 1½-5 assess behavioral, emotional and somatic problems (Döpfner & Kinnen, 2011; Plück & Döpfner, 2011).

In the PICARTA-B study, we used the CBCL's internalizing, externalizing and total problem meta-scales. For both CBCL measures, a cut-off T-value of ≥60 was deemed clinically significant. Recall time span was set to one week for the baseline assessment and one month for the evaluations performed at T1 and T2.

1.8.3.1 Child Behaviour Checklist 4-18 (CBCL 4-18)

The CBCL 4-18 is divided into two sections. The first section consists of 20 competence items, and the second section of 120 items on behavioral and emotional problems. Each item is coded on a 3-point Likert scale (0-2). By summing the 120 items on behavior and emotional problems, eight syndrome and three meta-scales (consisting of a selection of syndrome scales) can be computed (Table 19). Thirty-three items are not taken into account in the three meta-scales. No T-scores are available for the mixed problems scale. For the total problems score, 118 items are counted, with items #2 (allergy) and #4 (asthma) excluded (Döpfner & Kinnen, 2011).

Table 19.
CBCL 4-18 meta-scales with corresponding syndrome scales (number of items in brackets)

Internalizing problems	Externalizing problems	Mixed problems	Total problems
Withdrawn (9)	Delinquent rule-breaking behavior (13)	Social problems (8)	118 items (items 2 & 4 not counted)
Somatic complaints (9)	Aggressive behavior (20)	Thought problems (7)	
Anxious/depressed (14)		Attention problems (11)	

The raw data can be transformed into sex- and age-dependent T-scores. The reference sample consists of 1964 Swiss children and adolescents ages six to 18 years (Steinhausen, Winkler Metzke, & Kannenberg, 1996). Internal consistency ranges from α=.53 (somatic complaints) to α=.86 (aggressive behavior). Notably, half of the eight syndrome scales have α scores below 0.70 (somatic complaints, α=.53; social problems, α=.69; thought problems, α=.59; delinquent behavior, α=.61). Cronbach's alpha values for the meta-scales were α=.85 and α=.88 for internalizing and externalizing problems, respectively. For the total problems score, internal consistency was α=93. Factor analyses based upon the clinical Swiss sample (N=630) exhibited good factorial validity for the syndrome scales. Content validity is assumed, because both questionnaire instructions and item instructions are standardized (Steinhausen et al., 1996).

In PICARTA-B's final sample, internal consistency for the total scale was excellent (α=.94 at T0, α=.93 at T1, α=.94 at T2). For the internalizing problems meta-scale, Cronbach's alpha

was .88 at T0, .87 at T1, and .91 at T2; while for the externalizing problems meta-scale, internal consistency was α=.88 at T0, α=.85 at T1, and α=.92 at T2.

1.8.3.2 Child Behaviour Checklist 1½-5 (CBCL 1½-5)

The *Child Behaviour Checklist 1½-5* (CBCL 1½-5) is a parental proxy-report questionnaire for pre-school children ages 1½ to five years. This measure was developed by Achenbach & Rescorla (2000), based upon the CBCL 4-18. In 2002, the CBCL 1½-5 was translated into German (Arbeitsgruppe Deutsche Child Behavior Checklist, 2002).

The CBCL 1½-5 consists of 99 predefined items and an open question for "other problems". Each item is coded on a 3-point Likert scale (0-2). Items can be allocated to seven subscales (Table 20). The internalizing and externalizing problem meta-scales are comprised of 36 and 24 items, respectively, with an additional 7 and 33 items addressing sleep issues and other problems, respectively. All 100 items are summed to generate a total problem score. By recombining the items, five DSM-oriented scales can be constructed (affective problems, anxiety problems, pervasive developmental problems, attention deficit/hyperactivity problems and oppositional defiant problems; Achenbach & Rescorla, 2000).

Raw data for the two meta-scales and for the total problem scale can be transformed into T-values (Achenbach & Rescorla, 2000). To date, no Swiss or German reference data have been published for the CBCL 1½-5 (Plück & Döpfner, 2011). Therefore, we used American reference data (Achenbach & Rescorla, 2000) that were derived from a normative sample of 700 healthy children ages 18 to 71 months old.

Content, criterion, and construct validity have been carefully inspected and found to support this measure's validity. Among the seven subscales, 8-day test-retest reliability ranged from r_{tt}=.68 (anxious/depressed) to r_{tt}=.92 (sleep problems). For the internalizing, externalizing and total problem scales, test-retest reliability values were r_{tt}=.90, r_{tt}=.87, and r_{tt}=90, respectively. Test-retest reliability for the DSM-oriented scales ranged from r_{tt}=.74 (attention deficit/hyperactivity problems) to r_{tt}=.87 (oppositional defiant problems). Overall mean reliability was r_{tt}=.85 (Achenbach & Rescorla, 2000).

Table 20.
CBCL 1½-5 meta-scales with corresponding syndrome scales (number of items in brackets)

Internalizing problems (36)	Externalizing problems (24)	Total problems (100)
Emotionally reactive (9)	Attention problems (5)	All 100 items
Anxious/depressed (8)	Aggressive behavior (19)	
Somatic complaints (11)		
Withdrawn (8)		

To compute internal consistency, the authors matched children for the referred and non-referred reference samples by demographics. Based upon this sample of 563 matched

children, Cronbach's alpha values for the internalizing, externalizing and total problem scales were .89, .92 and .95, respectively.

In the final PICARTA-B study sample, internal consistency for the total scale was excellent (α=.94 at T0, α=.96 at T1, α=.94 at T2). Meanwhile, for the internalizing problems scale, Cronbach's alpha was α=.77 at T0, α=.90 at T1, and .84 at T2; and for the externalizing problems scale, α=.87 at T0, α=.92 at T1, and α=.90 at T2.

1.8.4 Depression

The number of depression symptoms was assessed using the *Depressionsinventar für Kinder und Jugendliche* (DIKJ, Stiensmeier-Pelster, 2000). The DIKJ is a revised version of the German version of the *Children's Depression Inventory* (CDI, Kovacs, 1985), the *CDI-d* (Stiensmeier, 1988). Reference data are available for approximately 2500 children ages 10 to 16 years (Stiensmeier-Pelster, 2011). The DIKJ supports the diagnosis of a depressive disorder and indicates its degree of severity. It is a self-report questionnaire that can be used in children and adolescents ages eight to 16 years. However, it is recommended that the items be read to children with delayed reading skills. The 26 items cover emotional, motivational, physical and cognitive symptoms of depression. It asks whether symptoms were recently present. For each item, one of three response options must be chosen, with responses coded from zero to 2. In order to compare raw values with the reference sample, item scores can be summed and converted into T-values. However, a cut-off of 18 raw points corresponds to a T-value of 60 and accurately identifies children as either depressed or not depressed (Stiensmeier-Pelster, 2011).

With standardized presentation, good objectivity is guaranteed. Internal consistency also was good (α=.84). Eight-week test-retest reliability was r_{tt}=.76. As the measure was constructed based upon the DSM-IV-TR criteria (American Psychiatric Association, 2000), content validity can be assumed. Sensitivity and specificity for depression have been measured at 60.5% and 78.9%, respectively (Stiensmeier-Pelster, 2011).

In the final sample of the present study, Cronbach's α values all were good to excellent (α=.84 at T0, α=.90 at T1 and α=.89 at T2).

1.8.5 Socio-economic Status

The parent's socio-economic status (SES) was defined based upon the study by Largo et al. (1986), who provided specific examples of occupational levels. Because Swiss mothers of young children often quit working to stay at home with their children (Graf et al., 2011), for fathers occupational level and for mothers educational level was used. Both levels were assessed on a 6-point scale with higher levels representing higher occupational or educational

levels (e.g., an educational level of 6 = university). Adding these two values resulted in a range from two to 12 points. Families then were allocated to three social classes based upon these summation scores: lower class (2-5), middle class (6-9), and upper class (10-12). If either the paternal or maternal value was missing, the available value was doubled. It has been shown that this measure is a valid indicator of SES in Swiss families with children or adolescents (Landolt, Vollrath, & Ribi, 2002b).

1.8.6 Injury Severity

Injury severity was rated using the *Injury Severity Score* (ISS; Baker, O'Neill, Haddon, & Long, 1974). The ISS was derived from the *Abbreviated Injury Severity Scale* (AIS; Greenspan, McLellan, & Greig, 1985) with the intent to rate injury severity among poly-traumatized individuals while considering both the severity of trauma and the number of body areas involved. Compared to the AIS, the ISS uses six instead of seven body regions, as well as a slightly different coding system. Nevertheless, the list of possible injuries remains unchanged from those of the AIS-80 Committee (Committee on Injury Scaling: The Abbreviated Injury Scale - 1980 Revision). They include injuries of the: (1) head or neck (including the spine), (2) face, (3) chest, (4) abdominal or pelvic contents, and (5) extremities or pelvic girdle, as well as (6) external injuries. Injuries then are rated across five levels of severity: (1) *minor*, (2) *moderate*, (3) *severe but not life-threatening*, (4) *severe and life threatening*, and (5) *critical, with survival uncertain* (Greenspan et al., 1985).

A quadratic relationship was identified between the AIS and mortality rate. However, including more than the three most-severely injured areas did not lead to any significant increase in this correlation. Hence, the ISS is computed by summing the squares of the three highest values. Consequently, ISS scores range from zero to 75, with a score of 40 found to be lethal in 50% of patients (Greenspan et al., 1985). For the present study, information regarding the injury was extracted from the child’s medical records, and severity rated by the author.

2 Characteristics and Efficacy of Early Psychological Interventions in Children and Adolescents after Single Trauma: A Meta-Analysis

Kramer, D. N., & Landolt, M. A. (2011). Characteristics and efficacy of early psychological interventions in children and adolescents after single trauma: a meta-analysis. *European Journal of Psychotraumatology, 2*.

2.1 Abstract

Background: Single traumatizing events are associated with an elevated rate of psychological disorders in children and adolescents. To date, it remains unclear whether early psychological interventions can reduce longer-term psychological maladjustment. *Objective:* To systematically review the literature to determine the characteristics and efficacy of early psychological interventions in children and adolescents after a single, potentially-traumatizing event. *Design:* Systematic searches were conducted of all relevant bibliographic databases. Studies on early psychological interventions were included if the first session was conducted within one month of the event. Two independent observers assessed each study for eligibility, using pre-determined inclusion and exclusion criteria, and rated the study's methodological quality. A meta-analysis was conducted on the group effects between individuals allocated to intervention versus control groups. Hence, effect sizes and confidence intervals were computed, as well as heterogeneity and analog-to-the ANOVA analyses. *Results:* Seven studies (including four randomized controlled trials, RCT) met the inclusion criteria. Depending upon the specific outcome variable (e.g., dissociation, anxiety and arousal), small to large beneficial effect sizes were noted. Although the meta-analysis revealed unexplained heterogeneity between the effect sizes of the included studies, and though studies varied greatly with regards to their methodological quality and the interventions tested, findings suggest that early interventions should involve psycho-education, provide individual coping-skills, and probably involve some kind of trauma exposure. Also, a stepped procedure that includes an initial risk screen and the provision of multiple sessions to those children at risk may be a promising strategy. *Conclusions* To date, research on the effectiveness of early interventions in children after a potentially-traumatizing event remains scarce. However, our review suggests that early interventions may be helpful.

2.2 Introduction

Potentially-traumatizing events, ranging from car accidents to natural disasters, are frequent in children and adolescents. Approximately two fifths to two thirds of children and adolescents in two U.S. studies (Copeland et al., 2007; Giaconia et al., 1995) and 15% to 22.5% in two European samples (Essau et al., 1999; Perkonigg et al., 2005) had already experienced at least one potentially-traumatizing event in their life. Meta-analysis conducted by Kahana et al. (2006) revealed that up to one fifth of children develop post-traumatic stress disorder (PTSD) after various single traumatizing events. Recently, Kronenberg et al. (2010) and LeBrocque et al. (2010) examined trajectories over 3 years in children and adolescents after a hurricane, and over 2 years after accidental injuries, respectively. Both studies identified the same three trajectories, with 70-90% of the children either resilient or recovered

and exhibiting good adaptive functioning within months of the traumatizing event. By contrast, the remaining 10-30% had a chronic course, with significant symptomatology and dysfunction, including PTSD, even 2-3 years later (Kronenberg et al., 2010; Le Brocque et al., 2010).

To prevent such chronic trajectories, early interventions are needed. However, to date, very limited evidence exists to indicate how to best intervene in children in the aftermath of a single traumatic event, and no evidence-based standardized procedure is widely accepted. While systematic reviews on the efficacy of early single interventions in adults have demonstrated either no or even harmful effects (Roberts, Kitchiner, Kenardy, & Bisson, 2010a; Rose et al., 2009), multi-session, trauma-focussed cognitive behavioral therapy (tf-CBT) interventions for individuals at high risk may be efficient (2010b). However, the evidence for children and adolescents is unclear. Therefore, the aim of this study was to conduct a systematic review of all studies on early psychological interventions in children and adolescents after a single traumatizing event. The objectives were (1) to investigate the characteristics of early psychological interventions, and (2) to conduct a meta-analysis on the group effects between individuals allocated to an intervention versus a control group. Based upon the findings, clinical implications and recommendations for future research are given.

2.3 Methods

2.3.1 Data Sources and Search Strategies

In August 2010, systematic searches using predifined keywords in English and German language (see Figure 10) for empirical studies and dissertations were conducted of EMBASE, CINAHL, PsycINFO, PSYNDEX, the Cochrane database of clinical trials and systematic reviews, NDLDT, ProQuest Digital Dissertation, and Dissonline.de.

The Boolean operator “and” was used to link the three groups of keywords for the patient population, the intervention, and the psychiatric disorder, respectively. The search terms within the groups were combined with the operator “or”. To exclude articles, the operator “not” was used. Not all databases allowed the same complexity of keyword combinations.

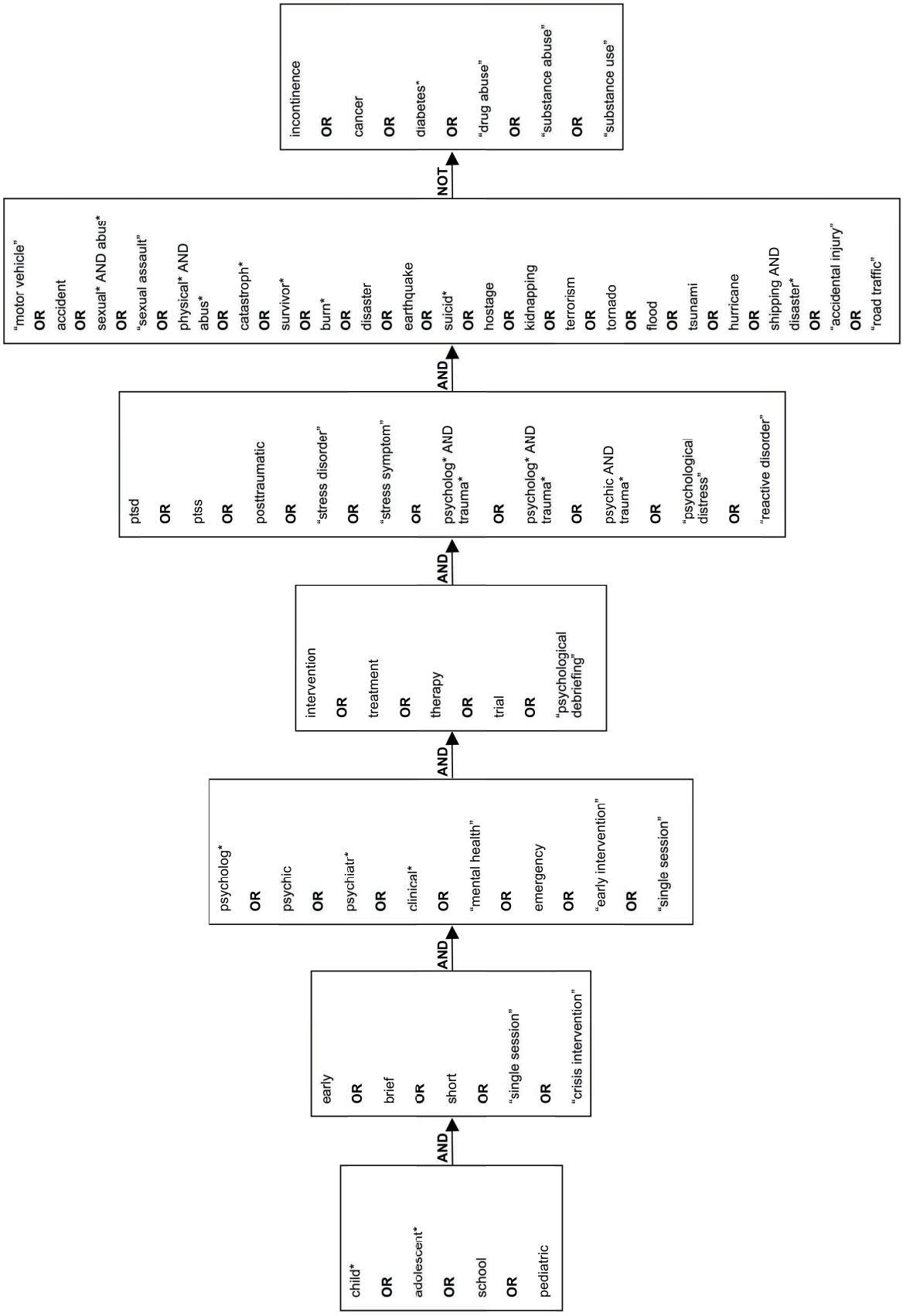

Figure 10.
Search criteria tree

Thus, less complex combinations were created, in accordance with the capacity of the database. Furthermore, reference lists of relevant studies and reviews were revised and authors in the field were contacted for unpublished data.

2.3.2 Study Selection

Studies were included if they met the following criteria (see Appendix 9): (1) all participants ≤ 18 years old; (2) experience of a single traumatic event; (3) first intervention session within 4 weeks after the traumatizing event; (4) at least one standardized measure of PTSD or PTSS (posttraumatic stress symtoms) applied; (5), prospective study design with a control group and at least one follow-up assessment; (6) language of publication English or German; (7) details of the intervention described or general type stated; (8) descriptive statistics available.

The corresponding authors were contacted if additional information on a given study was needed. Reasons for exclusion were documented (see Appendix 10).

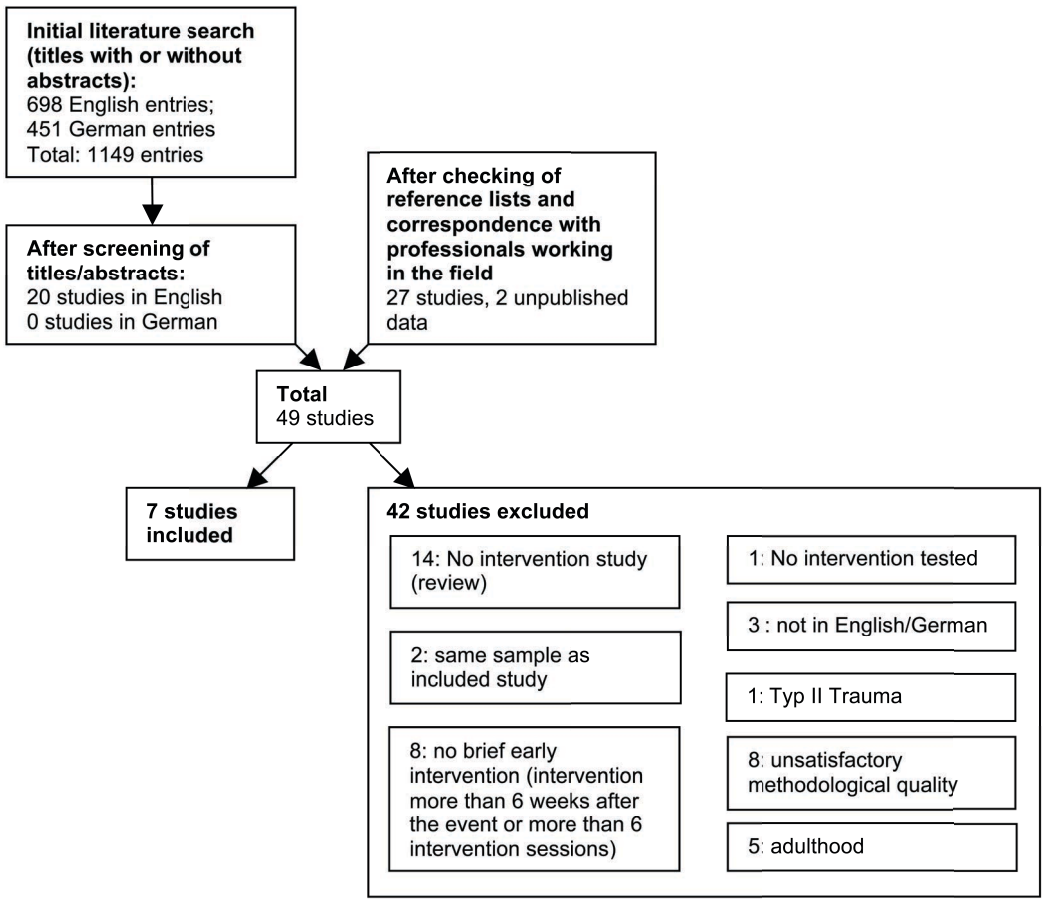

Figure 11.
Flowchart of study selection

The initial literature search yielded a total of 1149 entries. After screening titles and abstracts, 20 entries were identified to be of further interest. Examining reference lists and correspondence with professionals working in the field yielded an additional 29 studies. Hence, 49 full-text papers were reviewed. Inclusion and exclusion criteria were independently rated by the two authors, by means of a standardized checklist (see Appendix 9). Disagreements were discussed verbally until consensus was reached. Ultimately, 42 of the 49 studies were excluded, for a variety of reasons (see Figure 11).

2.3.3 Methodological Quality Rating

The methodological quality of each of the seven remaining studies was rated independently by the two authors using a standardized checklist with 22 items. Inter-rater reliability by Cohen was excellent, with κ=0.940 (95% CI=0.919-0.957). In any case of disagreement, consensus was achieved by discussion.

Twenty of the 22 items in the utilized checklist (see Appendix 11) were adapted from Roberts et al. (2010b). Additionally, two items were added to check for the availability of any drop-out analysis and to assess the use of both self and proxy report. Each item was assessed using either a two (0-1) or three point (0-2) scale, with higher values indicating better quality. A maximum total quality score of 42 points was possible.

Due to the specific study concept (web-based information provision), not all the criteria were applicable for two studies (Cox et al., 2010; Kenardy, Thompson, Le Brocque, & Olsson, 2008). Consequently, the percentaged portion of the applicable items that met the methodological criteria was calculated for each study with higher percentages standing for a better methodological quality. Based upon the mean overall percentage rate of 66%, two study groups were defined: *higher-quality* studies with quality ratings above the overall mean and *lower-quality* studies with ratings below the mean.

2.3.4 Data Extraction

Study methodology and characteristics are summarized in Table 21. Due to the inhomogeneous number, both of the follow-up assessments and data collection points among the different studies, the data were reduced to the following two time points: Follow-up #1 occurring less than 3 months from the traumatic event, and follow-up #2 3 or more months post-event. This allocation ensures that, for each outcome variable and follow-up time point, the data of each study are represented only once.

Table 21.
Summary of studies included in the review

Authors, year	Sample					Design			
	Origin	Number of participants	Age range	Type of trauma	Randomization	Double blinded	Control group	Follow-up
Berkowitz et al., 2010	USA	106	7 to 17	Potentially traumatic events (Motor vehicle accident; sexual abuse; witnessing violence; physical assault; injuries (e.g., sport); animal bite,; threats of violence)	Yes	No	Supportive comparison condition	4 weeks from baseline assessment (up to 2 months) and 3 months
Cox et al., 2010	AUS	56	7 to 16	Unintentional injuries including mild traumatic brain injury	Yes	No	No intervention	4 to 6 weeks and 6 months
Kenardy et al., 2008	AUS	103	7 to 15	Motor vehicle accidents, falls and sport injuries	No	No	Hospitalized without intervention	1 and 6 months
Poijula et al., 2001	FIN	89	13 to 17	Adolescent suicide	No	No	No intervention	6 months
Stallard et al., 2006	GB	158	7 to 18	Road traffic accidents	Yes	Yes	Neutral non-accident focused discussion	8 months
Yule et al., 1992	GB	24	14 to 16	Shipping disaster	No	No	Unaffected age and sex matched school	5 months
Zehnder et al., 2010	CH	99	7 to 16	Road traffic accidents	Yes	Yes	No intervention	2 and 6 months

Table 21.
Summary of studies included in the review (continued)

Intervention										
Authors, year	Type of intervention	Theoretical basis	Time to intervention post-trauma	Number of treatment sessions	Setting	Lead profesional	Psycho-education on posttraumatic stress symptoms	Normalization of acute stress reactions	Reconstruction of traumatic event
Berkowitz et al., 2010	Caregiver-Child Intervention (CFTSI)	Cognitive and behavioral	Within 30 days	4	Child and caregiver separately as well as together	Masters- and doctoral-level clinicians	Yes	Yes	No
Cox et al., 2010	Web-based information	Cognitive and resilience theory	2 to 3 weeks	Access 2 weeks posttrauma to the third post-intervention assessment after 6 months	Provision of written information for parents and child separately	No personal contact (written information provided)	Yes	Yes	Recommend that children and parents talk about and reflect upon the accident
Kenardy et al., 2008	Information booklet provision	Cognitive and behavioral	72 hours	1	Provision of written information for parents and child separately	No personal contact (written information provided)	Yes	Yes	Recommend that children and parents talk about and reflect the accident
Poijula et al., 2001	Defusing and psychological debriefing	Debriefing	1 to 7 days	1 to 2	Group	Trained clinical psychologists	Possibly	Possibly	Possibly
Stallard et al., 2006	Debriefing	Debriefing	28 days	1	Child alone	Researcher (without any information about her clinical experience or formation)	Yes	Yes	Detailed reconstruction
Yule et al., 1992	Group debriefing	Debriefing with problem-solving approach, based on cognitive behavioral methods	10 days	1	Group	Clinical psychologist (eventually among others)	Possibly	Possibly	Possibly
Zehnder et al., 2010	Cognitive behavioral early intervention	Cognitive and behavioral	10 days	1	One session with the child and at least one parent together	Clinical psychologist	Yes	Yes	Detailed reconstruction

Table 21.
Summary of studies included in the review (continued)

Intervention		
Authors, year	Type of coping-skills and topics addressed	Social Support
Berkowitz et al., 2010	Thought replacement methods for intrusive thoughts, breath retraining for anxiety, behavioral activation for depression and avoidance. Sleep disturbance, depressive withdrawal, oppositionality/ tantrums, intrusive thoughts, anxiety/ avoidance/ and phobic reactions, general overview of traumatic stress symptoms and techniques to manage them	Comparison of the measured responses in order to improve communication to enhance the emotional support provided by the caregiver
Cox et al., 2010	Instructions how to emotionally support the child and how to cope with own distress, relaxation, doing pleasant activities, identifying personal strengths, reflection 83ot he event.	Emphasize parental role 83ot he83 child's recovery
Kenardy et al., 2008	Time to relax for parents, accepting social support if necessary, provide emotional support 83ot he children, children may talk about the event and event-related feelings, return to normal activities	Recommendation to accept social support if necessary
Poijula et al., 2001	not mentioned	Not mentioned
Stallard et al., 2006	Extraction and discussion of trauma-related thoughts and feelings, general advice for how to cope with thoughts and feelings.	Not mentioned
Yule et al., 1992	Problem-solving approach to target anxiety, avoidance and intrusive thoughts	Not mentioned
Zehnder et al., 2010	Identification and support in modification of dysfunctional accident-related appraisals, provision of instructions on coping-skills	Recommend providing parental security to the child throughout the acute period

Table 21.
Summary of studies included in the review (continued)

Authors, year	Measures			Results	Quality Rating of Method
	Outcome variables - self	Outcome variables - proxy	Predictor variables - self or proxy	Reported outcome	percentage
Berkowitz et al., 2010	PTSD-RI, TSCC	-	THQ, PBI, PSS-Fa, BASC-2 (Baseline only), CBCL (Baseline only), PCL-C (Screening, Baseline only)	+ Significant time x group effects of PTSD-(TSCC) and anxiety(TSCC)-sympotms. Significant group differences in relation to re-experiencing and avoidance-symptoms (PTSD-RI)	81%
Cox et al., 2010	TSCC-A	-	IES-R (parents)	+ Significant time x group effects of anxiety (TSCC-A): Decrease in the intervention group; increase in the control group.	82%
Kenardy et al., 2008	CIES, SCAS	-	IES (parents), DASS (parents)	+ Significant time x group Effects in children's anxiety (SCAS) at the 1 month follow-up and the parental intrusion symptoms(CIES) and total PTSS (CIES) at the 6 months follow-up.	61%
Poijula et al., 2001	IES, HSIB	-	39-item inventory by Dyregrov et al. (1999)	= No Significant group differences in all outcome variables	33%
Stallard et al., 2006	CAPS-C, CIES, BDI, R-MAS, SDQ	SDQ	-	= No Significant group differences in all outcome variables	88%
Yule et al., 1992	IES, BDI, R-MAS, Modified form of the Fear Survey Schedule for Children	-	-	+ Significant group differences in intrusion (IES), overall PTSD symptoms (IES) and fears.	26%
Zehnder et al., 2010	IBS-P-KJ, IBS-A-KJ, DIKJ	CBCL	SES, life events, MISS	+ Significant group subgroup (7-11y) differences in depression (DIKJ) and behavior (CBCL) at 6 months follow up	90%

Note. BASC-2, Behavior Assessment System for Children, Second Edition-Self Report; BDI, Birleson Depression Inventory; CAPS-C, post-traumatic stress disorder scale for children; CBCL, Child Behaviour Checklist; CIES, Children's Revised Impact of Event Scale; DASS, Depression & Anxiety Stress Scale; DIKJ, German version of the Children's Depression Inventory (CDI); HSIB, Hogan Sibling Inventory of Bereavement; IBS-A-KJ, Interview for ASD similarly to assess DSM-IV-TR acute stress disorder symptoms; IBS-P-KJ, German version of the Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA); IES-R, The Impact of Events Scale- Revised; Kiddie-SADS-L, Semistructured interview for

the diagnosis of DSM-IV childhoood mental disorders derived from the Kiddie- Schedule for Affective Disorders and Schizophrenia for School Age Children (Kiddie-SADS); MISS, Modified Injury Severity Scale; PBI, Parent Behavior Inventory; PCL-C, PTSD Checklist-Civilian Version; PSS-Fa, Perceived Social Support-Familiy; PTSD-RI, UCLA posttraumatic stress disorder Index; R-MAS, Revised Manifest Anxiety Scale; SCAS, Pence Child Anxiety Scale; SDQ, Strengths and Difficulties Questionnaire; SES, Socio-economic status; STAI-C, State-Trait Anxiety Inventory for Children; THQ, Trauma History Questionnaire; TSCC, Trauma Symptom Checklist for Children; TSCC-A, The Trauma Symptom Checklist for Children-A.

2.3.5 Data Analyses

Whenever possible, between-group effect sizes (ES) and corresponding 95% confidence intervals (CI) at follow-up points 1 and 2 were calculated for the outcome measures. Given that different measures were used across the seven studies, *standard mean differences (SMD)* were used, defined as the difference between the mean of the intervention and the control group divided by the pooled standard deviation (Durlak, 2009). The latter was computed as per Lipsey & Wilson (2001). As SMDs based on small sample sizes are prone to a slight upward bias (Lipsey & Wilson, 2001), small sample size bias correction for d-type effect sizes were calculated for all SMDs (Hedges, 1981). The statistical significance of each SMD was computed (Wilson, 2005).

To ensure that each study had only one effect size per outcome variable, in the Berkowitz et al. (2011) study, a mean effect size was computed from the two applied instruments that measured PTSS (TSCC and PTSD-RI). As Zehnder et al. (2010) report significantly different results for the two studied subgroups, the effect sizes for these two subgroups (7 to 11 years and 12 to 16 years old) were entered separately into analysis. To respect the lower precision of effect size in studies with fewer subjects, a weighted mean effect size was calculated per outcome variable, by using the inverse variance (Lipsey & Wilson, 2001; Wilson, 2005).

To test the assumption that any differences between effect sizes are due to sampling error alone -- and that the effect sizes, therefore, estimate the same population effect size -- a homogeneity analysis was conducted. If such an analysis is found to be significant ($p_Q > 0.05$), the null hypothesis of homogeneity must be rejected, meaning that any variability among the SMDs exceeds what can be expected from sampling error alone (Lipsey & Wilson, 2001). In the latter case, analog-to-the ANOVA moderator analysis, while assuming a mixed effects model, was conducted (Lipsey & Wilson, 2001; Wilson, 2005). Study quality was chosen as a dichotomous moderator variable (higher/lower quality), whilst the intercept was deemed a random effect.

Given that all outcome variables in the analyzed studies measured symptom severity (e.g., PTSS), any negative SMD indicates improvement in the desired direction, with the intervention group superior to controls. The magnitude of the SMD was interpreted by means of Cohen's categories for effect sizes: 0.2 -0.5, small effect; 0.5 - 0.8, medium effect; > 0.8, large effect (Cohen, 1988).

To compare the effectiveness of higher versus lower quality studies, mean SMDs and 95% CIs were calculated for all seven studies together, and separately for higher and lower quality studies.

Whenever possible, the overall number and percentage of full-blown and partial PTSD diagnoses in the intervention and control groups were calculated for follow-up times 1 and 2. Furthermore, depending upon sample size, chi-square analysis or Fishers' exact test was used to assess the statistical significance of between-group differences within each separate study and across all studies when scores were combined separately for follow-up points 1 and 2.

In the present review, the terms PTSD and PTSS were differentiated from one another. PTSS was used when addressing symptom severity (i.e., continuous PTSD symptoms) and PTSD was used when addressing either the DSM disorder, as such, or the dichotomizable DSM diagnosis of partial or full blown PTSD.

2.4 Results

2.4.1 Description of Studies

Study methodology and characteristics are summarized in Table 21.

2.4.2 Origin

Four publications were conducted in Europe, two in Australia, and one in the United States.

2.4.3 Characteristics of the examined Samples

The overall sample sizes range from 24 to 158; and the age of participants ranges from 7 to 18 years. Trauma types were very heterogeneous. Four studies included only one type of trauma, such as a classmate's suicide (Poijula, Dyregrov, Wahlberg, & Jokelainen, 2001), road traffic accident (Stallard et al., 2006; Zehnder et al., 2010) or shipping disaster (Yule, 1992). Three studies examined heterogeneous samples, including physical and sexual interpersonal assault and/or various unintentional injuries (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008).

2.4.4 Study Design

Four publications were randomized controlled trials (RCT) (Berkowitz et al., 2011; Cox et al., 2010; Stallard et al., 2006; Zehnder et al., 2010), but only two of these were double-blinded (Stallard et al., 2006; Zehnder et al., 2010).

The control groups varied greatly in their quality, with most studies using a comparison group that received no intervention. Two studies (Cox et al., 2010; Zehnder et al., 2010) allocated

the children randomly to either an intervention or untreated control group. Kenardy et al. (2008) created an unmatched control group consisting of all those children who were medically treated in a hospital, where children did not receive any early psychological treatment. In the study of Poijula et al. (2001), the two schools that received no intervention were declared the control group *post-hoc*. Yule (1992) compared two girls' schools where children had been involved in a shipping disaster. One school accepted early help from the authors and the other did not. It remained unclear if and to what extent students at the latter (control) school received any help. Only two studies compared two different intervention conditions: Berkowitz et al. (2011) provided a 4-session supportive comparison condition. Stallard et al. (2006) carried out a neutral, non-accident-focused discussion about daily issues, like friends, favourite music, or sports.

The time points for follow-up ranged from one (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008) to eight (Stallard et al., 2006) months. Three studies included a single follow-up assessment (Poijula et al., 2001; Stallard et al., 2006; Yule, 1992), and four studies two follow-up assessments (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008; Zehnder et al., 2010). Most studies chose a follow-up assessment 5-6 months post trauma (Cox et al., 2010; Kenardy et al., 2008; Poijula et al., 2001; Yule, 1992; Zehnder et al., 2010).

2.5 Interventions

2.5.1 Theoretical Background

Most of the interventions were based upon elements of behavioral and cognitive therapy (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008; Zehnder et al., 2010). Three studies used a so-called "debriefing session" as the intervention (Poijula et al., 2001; Stallard et al., 2006; Yule, 1992). Yule (1992) used as their group debriefing an adopted problem-solving approach based on cognitive behavioral methods. Poijula et al. (2001) and Stallard et al. (2006) claimed that their interventions were a modified debriefing procedure adapted from Dyregrov (1991). Kenardy et al. (2008) and Cox et al. (2010) provided written psycho-educational information which was based on cognitive-behavioral and cognitive and resilience theory, respectively.

2.5.2 Elements of the Interventions

Psycho-education: The majority of the trials used psycho-education as an important element of the intervention (Cox et al., 2010; Kenardy et al., 2008; Stallard et al., 2006; Zehnder et al., 2010).

Trauma narrative: Stallard et al. (2006) and Zehnder et al. (2010) conducted a detailed reconstruction of the traumatic event by means of a trauma narrative. Notably, Zehnder et al.

(2010) used child-appropriate play material to accomplish this. It is not stated explicitly whether Poijula et al. (2001) and Yule (1992) reconstructed the traumatizing event with the children, though this is usually part of the debriefing procedure (e.g., Dyregrov, 1991; Mitchell & Everly, 1993). The information provided in the studies by Cox et al. (2010) and Kenardy et al. (2008) included recommendations to children and parents to talk about the accident. However, no guided reconstruction was conducted. Berkowitz et al. (2011) did not reconstruct the traumatic event with the child.

Coping-skills: All interventions except for that of Poijula et al. (2001) provided information and instructions on how to cope with specific trauma-related stressors. Most of them identified dysfunctional trauma-related cognitions and/or feelings in children and/or parents, which were processed with cognitive-behavioral methods (Berkowitz et al., 2011; Cox et al., 2010; Stallard et al., 2006; Zehnder et al., 2010). Poijula et al. (2001) and Yule (1992) may have such techniques as well, because it is part of the original debriefing procedure. However, this is not explicitly mentioned in their publications. Berkowitz et al. (2011) subsumed the coping-skills within the wrap-up of the family intervention. They divided stress reactions into five areas, and corresponding skills were discussed with each child and the parents. Unfortunately, very few details on the coping skill interventions are provided in the manual (Kassam-Adams, Marsac, & Cirilli, 2010). One further study also suggested using relaxation techniques (Cox et al., 2010). Two authors recommended that the child should return to normal activities (Kenardy et al., 2008; Zehnder et al., 2010). Comparable to this, Cox et al. (2010) suggested that children should do pleasant things. The authors also reminded the child of his/her personal resources (Cox et al., 2010). Albeit the discussion of coping-skills was usually directly addressed to the child, Cox et al. (2010) and Kenardy et al. (2008) provided coping-skills for parental distress.

Social support: The main aim of the intervention by Berkowitz et al. (2011) was to improve the communication between the child and parents. Three other studies also picked social support as the central issue. Cox et al. (2010) emphasized the parent's role in the child's recovery, whereas Kenardy et al. (2008) suggested that parents accept external social support, if necessary. Zehnder et al. (2010) recommended that the parents and child seek social support to cope with acute stress reactions, while the parents additionally were instructed in how to support their child in general.

2.5.3 Age

All interventions focused on children 6-18 years old; the vast majority of the studies provided interventions that were not adapted to the child's developmental stage. Only the intervention offered by Cox et al. (2010) and Kenardy et al. (2008) addressed two different age-groups.

The wording of the information provided was adjusted to the child's cognitive ability and reading skills.

2.5.4 Time Line for Treatment

The first intervention session was held one day to one month post-trauma. Stallard et al. (2006) and Berkowitz et al. (2011) started their intervention not later than day 28 and 30, respectively. No information regarding the mean duration or standard deviation for this sizeable time span is available. However, their four sessions were completed within 28.9 days (SD=12.87 days).

2.5.5 Number of Sessions

Three of the five studies in which a face to face intervention was provided consisted of a single session (Stallard et al., 2006; Yule, 1992; Zehnder et al., 2010). Poijula et al. (2001) provided one or two and Berkowitz et al. (2011) four sessions. It remains unclear how many of the individuals in the former study received two sessions. For the web-based intervention offered by Cox et al. (2010), the number of website accesses by the participants was not registered. However, the participants had access to the information 2 weeks post-trauma until the third assessment time point after 6 months (Cox et al., 2010). The information brochure handed out by Kenardy et al. (2008) was read by 97% of the parents and by 83% of the children in the intervention group. It was not recorded whether the leaflet was read more than once.

2.5.6 Setting

The family members attending the intervention sessions varied between studies. Berkowitz et al. (2011) conducted their sessions with the child and the caregiver separately, as well as together. Zehnder et al. (2010) held a single conjoint session with the child and at least one parent. The written information used in the studies of Cox et al. (2010) and Kenardy et al. (2008) was provided to parents and children separately, without face to face contact. The two studies with several children involved in the same disaster used a group format (Poijula et al., 2001; Yule, 1992). Stallard et al. (2006) used an individual format with the child alone participating in the intervention.

2.5.7 Lead Professional

The intervention usually was provided by clinically-experienced professionals, like master- or doctoral-level psychologists (Berkowitz et al., 2011; Poijula et al., 2001; Yule, 1992; Zehnder et al., 2010). Only the intervention in Stallard et al. (2006) was provided by a researcher, whose clinical experience and education are not stated. The psycho-educational intervention

offered by Cox et al. (2010) and Kenardy et al. (2008) was not delivered personally, but in written form.

2.6 Methodological Quality Assessment

The study quality ranged from 26% to 90% (see Table 21). Four studies reached higher quality with percentages above the mean of 66% (Berkowitz et al., 2011; 81%; Cox et al., 2010; 82%; Stallard et al., 2006; 88%; Zehnder et al., 2010; 90%) and 3 studies were of lower quality with ratings below this mean (Kenardy et al., 2008; 61%; Poijula et al., 2001; 33%; Yule, 1992; 26%).

Although all seven studies used reliable and valid measures of change with good psychometric properties, few studies assessed parameters using multi-modal measures (Berkowitz et al., 2011; Stallard et al., 2006; Zehnder et al., 2010) and by involving different informants (Zehnder et al., 2010). Potential confounders were controlled in just three studies (Berkowitz et al., 2011; Stallard et al., 2006; Zehnder et al., 2010). There was no clearly defined population and an inadequate randomization, primarily in the three studies with the lowest quality scores (Kenardy et al., 2008; Poijula et al., 2001; Yule, 1992). These studies also used qualitatively poor control groups. Only two studies were double-blinded (Stallard et al., 2006; Zehnder et al., 2010). An *a priori* power calculation to estimate the required sample size was conducted for only two studies (Cox et al., 2010; Zehnder et al., 2010). Only Berkowitz et al. (2011) checked treatment fidelity independently.

2.7 Effectiveness of Interventions

Table 22 shows the between-group SMDs and 95% CIs for all available outcome variables at the follow-up time points 1 and 2. For each follow-up only studies with available data for the respective time point were listed. Figure 12 and Figure 13 visually illustrate the distribution of the mean SMDs and the corresponding 95 % CIs. The incident rates of PTSD are presented in Table 23, including the test of between-group significance.

For between-group comparisons, heterogeneity analyses revealed significant heterogeneity for the included SMDs in terms of PTSS, dissociation, anxiety and proxy-reported behavior at follow-up points 1 and 2 and for avoidance at follow-up 2 (see *Q* in Table 22). Applying analog-to-the ANOVA moderator analysis, no significant differences between the SMDs of lower and higher quality studies could be identified for any outcome variable. Therefore, these results are not presented.

The mean overall effect sizes for the outcome measures ranged from 0.04 to -1.26. Notably, none of the means indicated any harmful overall effects. The CI of the averaged mean SMDs mostly included zero and, therefore, did not reach significance. However, the vast majority of the CI's were negative, indicating a trend towards a beneficial effect.

Dissociation, arousal and anxiety exhibited the largest overall effects, ranging from small (-0.21) to large (-1.26). Out of all the outcome variables, only dissociation and anxiety achieved statistical significance, implying positive interventional effects. It is noteworthy that the study by Berkowitz et al. (2011) contributed most to the beneficial effects of early intervention for dissociation and anxiety. Even though fear, anger and self-reported behavior also revealed positive, but small effects, these SMDs were based upon a single study and, as such, cannot be interpreted as mean overall effects.

Although the overall intervention effects for depression and proxy-reported behavior were negligible, the single effect sizes identified by Zehnder et al. (2010) suggest that their intervention was more helpful for younger (7 to 11 years of age) versus older children (12-16 years of age). By contrast, for PTSS, at follow up 2, the data from Kenardy et al. (2008) suggest an unfavorable effect. Notably, these highly-positive SMDs (i.e., PTSS at follow-up 2: SMD=0.87, 95% CI=0.27 to 1.47; $p<.01$) are due to different levels at baseline. However, in both the control and intervention group, PTSS decreased over time, with the control group recovering more quickly (Kenardy et al., 2008). Only four authors provided data for full-blown and partial PTSD (Berkowitz et al., 2011; Kenardy et al., 2008; Stallard et al., 2006; Zehnder et al., 2010). There were no significant overall between-group effects (see Table 23).

Taken together, dissociation and anxiety are the areas for which the greatest and most significant mean intervention effects were observed. In general, the overall SMDs at both follow-up time points indicate beneficial but generally small effects of early interventions, ranging from 0.04 to -1.26, with the majority between -0.10 and -0.60. The 95% CIs vary widely, ranging from negative to positive. However, most of the 95% CIs lie in the negative range. Heterogeneity analysis revealed that the degree of variety between the single effect sizes, which were averaged into these mean SMDs, might not estimate the same population mean effect sizes. In the same way, the analog-to-the ANOVA analysis could not uncover the source of this variability, such as random effects or a moderator like study quality.

Table 22.
Between-group standardized mean differences (SMDs)

f/u 1 (< 3 months)			Posttraumatic Stress Symptoms							Intrusion								Avoidance							
Authors, year	f/u time point		n (Int)	n (Ctrl)	SMD	CI			p	measure	n (Int)	n (Ctrl)	SMD	CI			p	measure	n (Int)	n (Ctrl)	SMD	CI			p	measure
Berkowitz et al., 2010	up to 2 mo		48	48	-.71	-1.12	to	-.30	<.01	TSCC, PTSD-RI	42	42	-.41	-.84	to	.03	n.s.	PTSD-RI	42	42	-.50	-.93	to	-.06	<.05	PTSD-RI
Cox et al., 2010	4-6 wks		30	32	.11	-.39	to	.60	n.s.	TSCC-A																
Kenardy et al., 2008	1 mo		16	36	.24	-.35	to	.83	n.s.	CIES	17	37	.15	-.43	to	.72	n.s.	CIES	16	36	.18	-.41	to	.77	n.s.	CIES
Zehnder et al., 2010 (Sub-group 7-11 y)	2 mo		22	28	.27	-.29	to	.83	n.s.	CAPS-CA	22	28	.36	-.20	to	.92	n.s.	CAPS	22	27	.22	-.35	to	.78	n.s.	CAPS
Zehnder et al., 2010 (Sub-group 12-16 y)	2 mo		27	22	.05	-.51	to	.62	n.s.	CAPS-CA	27	22	.06	-.51	to	.62	n.s.	CAPS	27	22	.18	-.39	to	.74	n.s.	CAPS
			n (Int)	n (Ctrl)	SMD	CI			p	Q	n (Int)	n (Ctrl)	SMD	CI			p	Q	n (Int)	n (Ctrl)	SMD	CI			p	Q
Total			143	166	-.10	-.33	to	.12	n.s.	sign.	108	129	-.03	-.29	to	.23	n.s.	n.s.	107	127	-.06	-.32	to	.20	n.s.	n.s.

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 1 (< 3 months)		Arousal							Dissociation							Depression						
Authors, year	f/u time point	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure
Berkowitz et al., 2010	up to 2 mo	42	42	-0.48	-0.91	to -0.04	<.05	PTSD-RI	53	53	-2.57	-3.08	to -2.05	<.01	TSCC							
Cox et al., 2010	4-6 wks								30	32	-0.01	-0.51	to 0.49	n.s.	TSCC-A	30	32	0.09	-0.40	to 0.59	n.s.	TSCC-A
Kenardy et al., 2008	1 mo																					
Zehnder et al., 2010 (Sub-group 7-11 y)	2 mo	22	28	0.08	-0.48	to 0.64	n.s.	CAPS								22	28	-0.53	-1.10	to 0.03	n.s.	CDI
Zehnder et al., 2010 (Sub-group 12-16 y)	2 mo	27	22	-0.05	-0.62	to 0.51	n.s.	CAPS								27	22	0.09	-0.48	to 0.65	n.s.	CDI
		n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q
Total		91	92	-0.21	-0.50	to 0.08	n.s.	n.s.	83	85	-1.25	-1.61	to -0.89	<.001	Sign.	79	82	-0.10	-0.41	to 0.21	n.s.	n.s.

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 1 (< 3 months)			Anxiety							Anger						Behaviour (proxy reported)								
Authors, year	f/u time point		n (Int)	n (Ctrl)	SMD		CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure
Berkowitz et al., 2010	up to 2 mo		53	53	-3.44	-4.04	to	-2.84	<.01	TSCC														
Cox et al., 2010	4-6 wks		30	32	0.32	-0.18	to	0.82	n.s.	TSCC-A	30	32	-0.04	-0.54	to	0.46	n.s.	TSCC-A						
Kenardy et al., 2008	1 mo		28	56	0.35	-0.11	to	0.80	n.s.	SCAS														
Zehnder et al., 2010 (Sub-group 7-11 y)	2 mo																	22	28	-0.46	-1.03	to	0.10	n.s.	CBCL
Zehnder et al., 2010 (Sub-group 12-16 y)	2 mo																	27	22	0.57	-0.01	to	1.14	n.s.	CBCL
			n (Int)	n (Ctrl)	SMD		CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q
Total			111	141	-0.58	-0.87	to	-0.28	<.001	Sign.	30	32	-0.04	-0.54	to	0.46	n.s.	-	49	50	0.04	-0.36	to	0.45	n.s.	Sign.

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 2 (3 to 8 months)																										
	f/u time point	Posttraumatic Stress Symptoms								Intrusion								Avoidance								
Authors, year		n (Int)	n (Ctrl)	SMD	CI			p	measure	n (Int)	n (Ctrl)	SMD	CI			p	measure	n (Int)	n (Ctrl)	SMD	CI			p	measure
Berkowitz et al., 2010	3 mo	48	47	-0.72	-1.14	to	-0.31	<.01	TSCC, PTSD-RI	42	41	-0.64	-1.08	to	-0.20	<.01	PTSD-RI	42	41	-0.47	-0.90	to	-0.03	<.05	PTSD-RI
Cox et al., 2010	6 mo	31	28	-0.13	-0.64	to	0.38	n.s.	TSCC-A																
Kenardy et al., 2008	6 mo	17	37	0.87	0.27	to	1.47	<.01	CIES	16	36	0.65	0.05	to	1.25	<.05	CIES	17	37	0.81	0.22	to	1.41	<.01	CIES
Poijula et al., 2001	6 mo	55	32	0.00	-0.44	to	0.44	n.s.	IES																
Stallard et al., 2006	8 mo	70	62	-0.08	-0.42	to	0.26	n.s.	CIES	70	62	-0.05	-0.39	to	0.30	n.s.	CIES	70	62	0.01	-0.33	to	0.35	n.s.	CIES
Yule, 1992	5 mo	24	15	-1.00	-1.68	to	-0.31	<.01	IES	24	15	-0.97	-1.65	to	-0.29	<.01	IES	24	15	-0.60	1.26	to	0.05	n.s.	IES
Zehnder et al., 2010 (Sub-group 7-11 y)	6 mo	22	28	-0.01	-0.57	to	0.55	n.s.	CAPS-CA	22	28	-0.07	-0.63	to	0.49	n.s.	CAPS	22	27	0.08	-0.48	to	0.65	n.s.	CAPS
Zehnder et al., 2010 (Sub-group 12-16 y)	6 mo	27	22	0.22	-0.35	to	0.78	n.s.	CAPS-CA	27	22	0.33	-0.24	to	0.89	n.s.	CAPS	27	22	0.09	-0.47	to	0.66	n.s.	CAPS
		n (Int)	n (Ctrl)	SMD	CI			p	Q	n (Int)	n (Ctrl)	SMD	CI			p	Q	n (Int)	n (Ctrl)	SMD	CI			p	Q
Total		294	271	-0.13	-0.30	to	0.04	n.s.	Sign.	201	204	-0.13	-0.33	to	0.07	n.s.	Sign.	202	204	-0.04	-0.23	to	0.16	n.s.	Sign.

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 2 (3 to 8 months)			Arousal							Dissociation							Depression						
Authors, year	f/u time point		n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure
Berkowitz et al., 2010	3 mo		42	40	-0.36	-0.79	to 0.08	n.s.	PTSD-RI	53	53	-2.22	-2.71	to -1.74	<.01	TSCC							
Cox et al., 2010	6 mo									31	28	-0.19	-0.70	to 0.32	n.s.	TSCC-A	31	28	-0.15	-0.66	to 0.37	n.s.	TSCC-A
Kenardy et al., 2008	6 mo																						
Poijula et al., 2001	6 mo																						
Stallard et al., 2006	8 mo		70	62	-0.05	-0.39	to 0.29	n.s.	CIES								70	62	-0.16	-0.51	to 0.18	n.s.	BDI
Yule, 1992	5 mo																24	15	-0.26	-0.91	to 0.39	n.s.	BDI
Zehnder et al., 2010 (Sub-group 7-11 y)	6 mo		22	28	-0.04	-0.60	to 0.52	n.s.	CAPS								22	28	-0.69	-1.26	to -0.11	<.05	CDI
Zehnder et al., 2010 (Sub-group 12-16 y)	6 mo		27	22	0.15	-0.41	to 0.72	n.s.	CAPS								27	22	0.26	-0.30	to 0.83	n.s.	CDI
			n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q
Total			161	152	-0.10	-0.32	to 0.12	n.s.	n.s.	84	81	-1.26	-1.62	to -0.91	<.001	Sign.	174	155	-0.18	-0.40	to 0.04	n.s.	n.s.

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 2 (3 to 8 months)		Anxiety							Fear							Anger						
Authors, year	f/u time point	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure
Berkowitz et al., 2010	3 mo	53	53	-1.59	-2.03	to -1.15	<.01	TSCC														
Cox et al., 2010	6 mo	31	28	-0.21	-0.72	to 0.30	n.s.	TSCC-A								31	28	-0.49	-1.01	to 0.03	n.s.	TSCC-A
Kenardy et al., 2008	6 mo	28	56	0.03	-0.43	to 0.48	n.s.	SCAS														
Poijula et al., 2001	6 mo																					
Stallard et al., 2006	8 mo	70	62	-0.08	-0.42	to 0.27	n.s.	R-MAS							Fear Survey Schedule for Children							
Yule, 1992	5 mo	24	15	-0.09	-0.73	to 0.56	n.s.	R-MAS	24	15	-0.51	-1.17	to	0.14	n.s.							
Zehnder et al., 2010 (Sub-group 7-11 y)	6 mo																					
Zehnder et al., 2010 (Sub-group 12-16 y)	6 mo																					
		n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q
Total		206	214	-0.40	-0.60	to -0.20	<.001	Sign.	24	15	-0.51	-1.17	to	0.14	n.s.	31	28	-0.49	-1.01	to 0.03	n.s.	-

Table 22.
Between-group standardized mean differences (SMDs) (continued)

f/u 2 (3 to 8 months)		Behaviour (self reported)							Behaviour (proxy reported)							Bereavement						
Authors, year	f/u time point	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure	n (Int)	n (Ctrl)	SMD	CI		p	measure
Berkowitz et al., 2010	3 mo															43	18	-0.06	-0.61	to 0.49	n.s.	HSIB
Cox et al., 2010	6 mo																					
Kenardy et al., 2008	6 mo																					
Poijula et al., 2001	6 mo																					
Stallard et al., 2006	8 mo	70	62	-0.28	-0.62	to 0.06	n.s.	SDQ														
Yule, 1992	5 mo																					
Zehnder et al., 2010 (Sub-group 7-11 y)	6 mo								22	28	-0.69	-1.27	to -0.12	<.05	CBCL							
Zehnder et al., 2010 (Sub-group 12-16 y)	6 mo								27	22	0.46	-0.11	to 1.03	n.s.	CBCL							
		n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q	n (Int)	n (Ctrl)	SMD	CI		p	Q
Total		C	62	-0.28	-0.62	to 0.06	n.s.	-	49	50	-0.11	-0.52	to 0.29	n.s.	Sign.	43	18	-0.06	-0.61	to 0.49	n.s.	-

Note. BDI = Birleson Depression Inventory; CAPS-CA = post-traumatic stress disorder scale for children and adolescents; CBCL = Child Behaviour Checklist; CDI = Children's depression inventory; CIES = Children's Revised Impact of Event Scale; DIKJ = German version of the Children's depression inventory (CDI); HSIB = Hogan Sibling Inventory of Bereavement; IBS-P-KJ = German version of the Clinician-Administered PTSD Scale for Children and Adolescents (CAPS-CA); IES = The Impact of Events Scale; * Berkowitz et al., 2010; Cox et al., 2010; Stallard et al., 2006; Zehnder et al., 2010; ** Kenardy et al., 2008; Poijula et al., 2001; Yule et al., 1992

2.8 Discussion

2.8.1 Type of Intervention

2.8.1.1 Theoretical Base

There is little variety regarding the theoretical base of the studies we analyzed, as half of the studies were categorized as either “behavioral and cognitive” (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008; Zehnder et al., 2010) or an adapted debriefing procedure (Poijula et al., 2001; Stallard et al., 2006; Yule, 1992). Due to the very superficial description of the theoretical backgrounds, the studies cannot be compared in this regard.

2.8.1.2 Content

While some interventions included narrative exposure as an important component (Cox et al., 2010; Yule, 1992; Zehnder et al., 2010), the study by Berkowitz et al. (2011) did not. Beneficial effects were reported for both types of studies. Therefore, it is unclear to what extent a trauma narrative should be part of early intervention.

Presumably, all studies provided psycho-education. However, Cox et al. (2010) and Kenardy et al. (2008) were the only investigators whose intervention focused exclusively on information provision. Since both studies reported a significant reduction in anxiety, psycho-education seems to be an effective component of early interventions.

The vast majority of studies included individually-provided coping-skills, though most authors failed to report how they were taught. With respect to specific kinds of coping-skills, such as general versus symptom specific coping-skills, no pattern of effectiveness could be found among the studies. Hence, it remains unclear to what extent coping-skill-directed interventions are helpful for a traumatized child’s recovery.

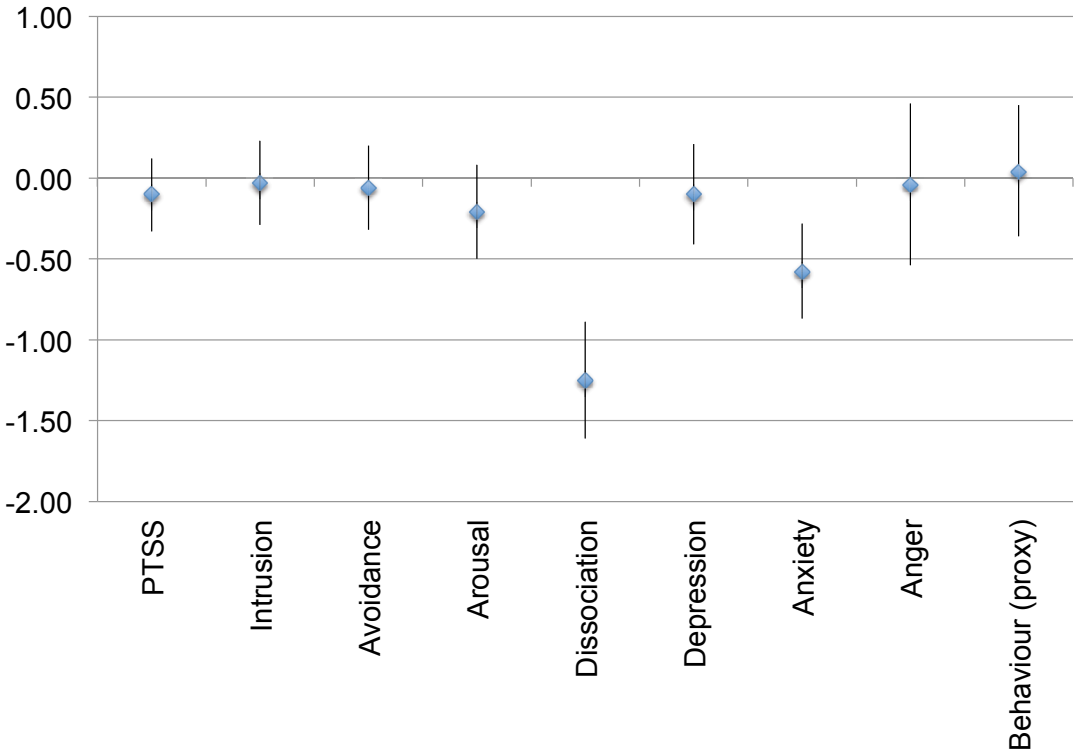

Figure 12.
Mean SMD and 95% CI at follow-up 1

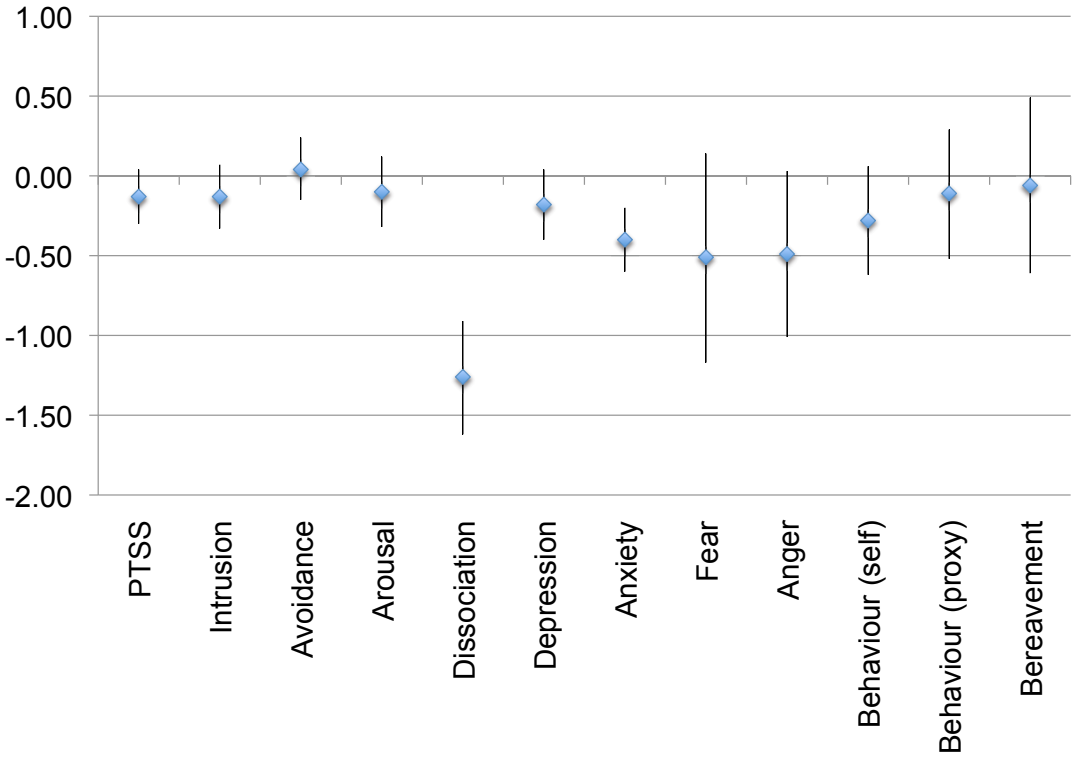

Figure 13.
Mean SMD and 95% CI at follow-up 2

2.8.1.3 Setting

The greater proportion of interventions addressed both the child and the caregiver. All yielded beneficial effects for at least some outcome variables (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008) or subgroups (Zehnder et al., 2010). Berkowitz et al. (2011) even declared improved communication between the parents and child as the core aim of their intervention. Notably, they achieved the greatest treatment effects. Among the three interventions that did not involve parents, one did yield beneficial effects (Yule, 1992), but two studies failed to do so (Poijula et al., 2001; Stallard et al., 2006). Moreover, the Yule (1992) study was the methodologically weakest study of the three. Taken together, our review suggests that involving parents may enhance the efficacy of early interventions.

With regards to when to offer some intervention, our review revealed great variability, with some interventions provided within the first few hours after trauma, and others not starting for almost one month. No clear association between the time of initiation and effectiveness of interventions emerged.

The vast majority of studies provided a single session. In line with what is known from early psychological interventions in adults (Roberts et al., 2010b), Berkowitz' (2011) study with four sessions suggests that more sessions may increase the benefits of a particular intervention. However, this conclusion must be interpreted with caution, because only one study systematically offered multiple sessions.

None of the studies included children < 7 years old, although it is known that pre-school children may suffer from clinically-significant PTSS after a single traumatic event (Meiser-Stedman et al., 2008). Zehnder et al. (2010) were the only authors who reported an influence of the child's age on the effectiveness of their intervention and found it more helpful for younger children (7-11 years).

Although the information booklets of Cox et al. (2010) and Kenardy et al. (2008) used age-appropriate wording, both studies did not provide any data on this issue. In summary, there is tentative evidence for the need of more developmentally-appropriate provision of early interventions.

In almost all studies, the intervention was provided to all children, irrespective of their early symptomatology. Interestingly, the study that identified the largest effect sizes used a stepped procedure, beginning with risk screening and subsequently providing the intervention only to children deemed at appreciable risk for long-lasting PTSS (Berkowitz et al., 2011). This finding is consistent with previous studies in adults that found a stepped procedure in the early aftermath of trauma to be effective (Roberts et al., 2010b).

Table 23.
Rates of incident post-traumatic stress disorder (PTSD)

Follow-up 1 (up to 3 months)

Study	PTSD Diagnosis	n (Int)	n (Ctrl)	n	time point after accident	Intervention group		Control group		Total		Test of between-group significance
Berkowitz et al., 2010	Full	53	53	106	1 month (Baseline)	23	43.4%	21	39.6%	44	41.5%	$\chi2 = 0.155$; df =1; p (2-tail) = 0.693 (n.s.)
	Partial	53	53	106	1 month (Baseline)	14	26.4%	10	18.9%	24	22.6%	$\chi2 = 0.862$; df =1; p (2-tail) = 0.353 (n.s.)
Kenardy et al., 2008	Full	30	58	88	1 month	0	0.0%	2	3.4%	2	2.3%	Fishers' exact: p (2-tail) = 0.545 (n.s.)
	Partial	30	58	88	1 month	3	10.0%	8	13.8%	11	12.5%	Fishers' exact: p (2-tail) = 0.743 (n.s.)
Stallard et al., 2006	Full	82	76	158	4 weeks	19	23.2%	27	35.5%	46	29.1%	$\chi2 = 2.918$; df =1; p (2-tail) = 0.088 (n.s.)
	Partial	-	-	-	-	-	-	-	-	-	-	-
Zehnder et al., 2010	Full	49	50	99	2 months	6	12.2%	1	2.0%	7	7.1%	Fishers' exact: p (2-tail) = 0.059 (n.s.)
	Partial	49	50	99	2 months	2	4.1%	5	10.0%	7	7.1%	Fishers' exact: p (2-tail) = 0.436 (n.s.)
Total	Full	214	237	451	1-2 months	48	22.4%	51	21.5%	99	22.0%	$\chi2 = 0.054$; df =1; p (2-tail) = 0.815 (n.s.)
	Partial	132	161	293	1-2 months	19	14.4%	23	14.3%	42	14.3%	$\chi2 = 0.001$; df =1; p (2-tail) = 1.000 (n.s.)

Follow-up 2 (3 to 6 months)

Study	PTSD Diagnosis	n (Int)	n (Ctrl)	n	time point after accident	Intervention group		Control group		Total		Test of between-group significance
Berkowitz et al., 2010	Full	53	53	106	3 months	7	13.2%	15	28.3%	22	20.8%	$\chi2 = 3.671$; df =1; p (2-tail) = 0.055 (n.s.)
	Partial	53	53	106	3 months	10	18.9%	15	28.3%	25	23.6%	$\chi2 = 1.309$; df =1; p (2-tail) = 0.253 (n.s.)
Kenardy et al., 2008	Full	24	50	74	6 months	0	0.0%	1	2.0%	1	1.4%	Fishers' exact: p (2-tail) = 1.000 (n.s.)
	Partial	24	50	74	6 months	3	12.5%	13	26.0%	16	21.6%	Fishers' exact: p (2-tail) = 0.238 (n.s.)
Stallard et al., 2006	Full	70	62	132	8 months	10	14.3%	7	11.3%	17	12.9%	$\chi2 = 0.263$; df =1; p (2-tail) = 0.608 (n.s.)
	Partial	-	-	-	-	-	-	-	-	-	-	-
Zehnder et al., 2010	Full	49	50	99	6 months	4	8.2%	0	0.0%	4	4.0%	Fishers' exact: p (2-tail) = 0.056 (n.s.)
	Partial	49	50	99	6 months	4	8.2%	5	10.0%	9	9.1%	Fishers' exact: p (2-tail) = 1.000 (n.s.)
Total	Full	196	215	411	3 to 7 months	21	10.7%	23	10.7%	44	10.7%	$\chi2 = 0.000$; df =1; p (2-tail) = 1.000 (n.s.)
	Partial	126	153	279	3 to 7 months	17	13.5%	33	21.6%	50	17.9%	$\chi2 = 3.064$; df =1; p (2-tail) = 0.080 (n.s.)

2.8.2 Effects

Of the seven studies we analyzed, five identified beneficial between-group treatment effects for at least one outcome variable (Berkowitz et al., 2011; Cox et al., 2010; Kenardy et al., 2008; Yule, 1992; Zehnder et al., 2010). Notably, no study reported harmful effects. The overall between-group effect sizes underlined these results by revealing promising beneficial tendencies with regards to dissociation, anxiety and, to some extent, arousal.

Conversely, intervention effects regarding PTSS and PTSD were small and non-significant. Therefore, early psychological interventions may not have any influence on posttraumatic stress symptoms after traumatizing events. Notably, while the overall intervention effects for PTSS across all studies were small, two studies revealed medium to large beneficial effects (Berkowitz et al., 2011; Yule, 1992). Berkowitz et al. used a stepped procedure, which may have enhanced the intervention's effects on PTSS. Meanwhile, the results of Yule (1992) must be interpreted with caution, as this study rated lowest in quality.

The reported effect sizes in the present review are comparable to those that were uncovered by a systematic review on the efficacy of individual trauma-focussed CBT (tf-CBT) in traumatized children and adolescents (Wethington et al., 2008: ES for PTSS=0.34). Notably, only about half of the 11 studies that were analyzed were randomized and controlled. Since publication of that review, three new RCTs on this topic have been published (Cohen, Mannarino, & Iyengar, 2011; Scheeringa, Weems, Cohen, Amaya-Jackson, & Guthrie, 2011a; Smith et al., 2007). The effect sizes in these studies were considerably greater (e.g., Scheeringa et al., 2011a: ES for PTSS=1.07; Smith et al., 2007: ES for PTSS=1.59). Thus, based upon the current literature, established trauma therapy, such as tf-CBT, clearly seems to be more effective than early interventions.

Heterogeneity analyses revealed significant results for the SMDs for every outcome variable. Therefore, differences between the studies might extend beyond sampling error. Our initial hypothesis that study quality may explain these heterogeneities could not be confirmed by moderator analysis. Therefore, the mean SMDs presented in this review generally should be interpreted with caution.

Overall, the present meta-analysis yielded encouraging results with regards to the beneficial effects of early interventions after a single traumatic event. However, because of certain limitations in our results, we are currently not able to provide definitive answers regarding the efficacy of early psychological intervention in children and adolescents after such events. For instance, the confidence intervals of effect sizes were wide, the methodological quality of the studies varied considerably, and the significant heterogeneity that exists between the effect sizes of single studies remains unexplained.

2.8.3 Methodological Shortcomings of the analyzed Studies

The mean overall quality of the included studies was satisfactory with a large variation between studies. Most studies had methodological shortcomings. For instance, although psychometrically sound measures were used, the vast majority were self-report questionnaires. Only three studies conducted clinical interviews (Berkowitz et al., 2011; Stallard et al., 2006; Zehnder et al., 2010). Furthermore, different informants were rarely

involved. Although assessors usually were trained, supplementary supervision to ensure treatment fidelity was only provided by Stallard et al. (2006). Independence of the outcome assessors by blinding was not often guaranteed. Taken together, these limitations could significantly impact the accuracy of outcome analyses. The three lower-quality studies also lacked control against possible confounders, clearly defined sample populations, adequate randomization, and appropriate control groups.

2.8.4 Shortcomings of this Systematic Review

Although each area was assessed by different measures (e.g., CDI and TSCC for depression), a single mean SMD was calculated for each area. It must be taken into consideration that, even though different measures presume to assess the same concept, they do not necessarily achieve the same result. For instance, in the present review, Berkowitz et al. (2011) assessed PTSS by means of the PTSD-RI and TSCC. The semi-structured PTSD-RI interview revealed lower SMDs than the self-reported TSCC, despite the fact that the two measures were applied to the same children.

Another common problem in research field is that of non-participants. Neither intervention studies nor systematic quality assessments are able to assess the reasons why people choose not to participate in an intervention study. For instance, one important reason for non-participation might be avoidance which, inevitably, would lead to meaningful bias.

2.8.5 Implications

2.8.5.1 Implications for Clinical Practice

Because the reviewed studies used different types of intervention, it is difficult to provide evidence-based clinical recommendations at this point. However, our findings suggest that early interventions in traumatized children should probably include age-appropriate psycho-education, the provision of individual coping-skills, parental involvement and, possibly, some form of trauma exposure (trauma narrative). Furthermore, the number of sessions may play an important role in the intervention's efficacy, with more sessions being more helpful than fewer. Finally, given that most children recover without professional help (Le Brocque et al., 2010), a stepped procedure should be considered, starting by screening children to assess their risk of long-term morbidity and to provide interventions to only those children who are at risk for long-term psychological problems.

2.8.5.2 Implications for Future Research

Several issues should be incorporated into future research. To increase methodological quality, randomized controlled trials should be conducted, incorporating sample sizes pre-

determined via *a priori* power analysis, and including an adequate follow-up period with at least two data collection points. To better address a child's emotional and cognitive developmental stage, age-appropriate interventions should be developed and evaluated, specifically for pre-schoolers. Although the range of different types of trauma within any one sample should be minimized, across studies, investigated traumas should include different trauma types, such as interpersonal physical and sexual assault and natural disasters. To improve intervention efficacy and for economic reasons, a stepped procedure should be used that includes initial screening to identify children at high risk. The intervention should be theory-based and thoroughly manualized. Additionally, treatment fidelity should be monitored by an independent professional. Both descriptive data and inferential analysis are warranted (e.g., provision of means, standard deviations and ESs with 95% CIs). One should assess a variety of clinical outcomes besides PTSD, as some symptoms (e.g., depression) often co-exist in individuals after a traumatizing event. Standardized and well-validated outcome measures should be both self- and proxy-reported. Furthermore, control variables should be assessed -- such as parental well-being and the child's pre-trauma psychological state -- as they may strongly influence the development of long-term psychological maladjustment. Because most previous studies applied several interventional elements at the same time, the efficacy of single elements cannot be examined separately. Therefore, future studies also should try to disentangle the specific effects of different interventional components, like psycho-education, trauma narratives, coping-skills training, and the treatment of parental stress reactions.

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Conflicts of interest: None declared.

2.10 References of Studies included in this Meta-Analysis

Berkowitz, S. J., Stover, C. S., & Marans, S. R. (2011). The Child and Family Traumatic Stress Intervention: Secondary prevention for youth at risk of developing PTSD. Journal of Child Psychology and Psychiatry, 52(6), 676-685.

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2010). A randomized controlled trial of a web-based early intervention for children and their parents following unintentional injury. Journal of Pediatric Psychology, 35(6), 581-592.

Kenardy, J. A., Thompson, K., Le Brocque, R., & Olsson, K. (2008). Information-provision intervention for children and their parents following pediatric accidental injury. European Child & Adolescent Psychiatry(5), 316-325.

Poijula, S., Dyregrov, A., Wahlberg, K. E., & Jokelainen, J. (2001). Reactions to adolescent suicide and crisis intervention in three secondary schools. International Journal of Emergency Mental Health, 3(2), 97-106.

Stallard, P., Velleman, R., Salter, E., Howse, I., Yule, W., & Taylor, G. (2006). A randomised controlled trial to determine the effectiveness of an early psychological intervention with children involved in road traffic accidents. Journal of child psychology and psychiatry, and allied disciplines, (2), 127-134.

Yule, W. (1992). Post-traumatic stress disorder in child survivors of shipping disasters: the sinking of the 'Jupiter'. Psychotherapy and Psychosomatics, 57(4), 200-205.

Zehnder, D., Meuli, M., & Landolt, M. A. (2010). Effectiveness of a single-session early psychological intervention for children after road traffic accidents: a randomised controlled trial. Child Adolesc Psychiatry Ment Health, 4(1), 7.

2.11 References to Studies excluded from this Meta-Analysis

Austin, L. S., & Godleski, L. S. (1999). Therapeutic approaches for survivors of disaster. *Psychiatric Clinics of North America, 22*(4), 897-910.

Bisson, J. I., Shepherd, J. P., Joy, D., Probert, R., & Newcombe, R. G. (2004). Early cognitive-behavioural therapy for post-traumatic stress symptoms after physical injury. Randomised controlled trial. *British Journal of Psychiatry, 184*, 63-69.

Brill, C., Fiorentino, N., & Grant, J. (2001). Covictimization and inner city youth: A review. *International Journal of Emergency Mental Health, 3*(4), 229-239.

Bronchard, M., Robin, M., Mauriac, F., Waddington, A., Noirot, M. N., Devynck, C. (2001). A review of treatment strategies for teen-age and adult rape victims seen rapidly after the assault. *Encephale, 27*(1), 1-7.

Bryant, R. A., Harvey, A. G., Dang, S. T., Sackville, T., & Basten, C. (1998). Treatment of acute stress disorder: a comparison of cognitive-behavioural therapy and supportive counseling. *Journal of Consulting & Clinical Psychology, 66*(5), 862-866.

Bryant, R. A., Moulds, M. L., Guthrie, R. M., & Nixon, R. D. (2005). The additive benefit of hypnosis and cognitive-behavioural therapy in treating acute stress disorder. *Journal of Consulting & Clinical Psychology, 73*(2), 334-340.

Brymer, M. J., Steinberg, A. M., Vernberg, E. M., Layne, C. M., Watson, P. J., Jacobs, A. K. (2009). Acute Interventions for Children and Adolescents. In E. B. Foa, T. M. Keane, M. J. Friedman & J. A. Cohen (Eds.), *Effective Treatment for PTSD* (second ed., pp. 106-116). New York: Guilford press.

Caffo, E., & Belaise, C. (2003). Psychological aspects of traumatic injury in children and adolescents. *Child and Adolescent Psychiatric Clinics of North America, 12*(3), 493-535.

Casswell, G. (1997). Learning from the aftermath: the response of mental health workers to a school bus crash. *Clinical Child Psychology and Psychiatry, 2*, 517-523.

Catani, C., Kohiladevy, M., Ruf, M., Schauer, E., Elbert, T., & Neuner, F. (2009). Treating children traumatized by war and Tsunami: a comparison between exposure therapy and meditation-relaxation in North-East Sri Lanka. *BMC Psychiatry, 13*, 22.

Chapman, L., Morabito, D., Ladakakos, C., Schreier, H., & Knudson, M. (2001). The Effectiveness of Art Therapy Interventions in Reducing Post Traumatic Stress

Disorder (PTSD) Symptoms in Pediatric Trauma Patients *Art Therapy: Journal of the American Art Therapy Association, 18*(2), 100-104.

Chemtob, C. M., Nakashima, J. P., & Carlson, J. G. (2002). Brief treatment for elementary school children with disaster-related posttraumatic stress disorder: a field study. *Journal of Clinical Psychology, 58*, 99-112.

Cohen, J. A. (2003). Treating acute posttraumatic reactions in children and adolescents. *Biological Psychiatry, 53*(9), 827-833.

Cohen, J. A., Bukstein, O., Walter, H., Benson, S. R., Chrisman, A., Farchione, T. R. (2010). Practice parameter for the assessment and treatment of children and adolescents with posttraumatic stress disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(4), 414-430.

Espie, E., Gaboulaud, V., Baubet, T., Casas, G., Mouchenik, Y., Yun, O. (2009). Trauma-related psychological disorders among Palestinian children and adults in Gaza and West Bank, 2005-2008. *International Journal of Mental Health, 3*(1), 21.

Foa, E. B., Zoellner, L. A., & Feeny, N. C. (2006). An evaluation of three brief programs for facilitating recovery after assault. *Journal of Traumatic Stress, 19*(1), 29-43.

Fremont, W. P. (2004). Childhood reactions to terrorism-induced trauma: a review of the past 10 years. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*(4), 381-392.

Galante, R., & Foa, D. (1986). An epidemiological study of psychic trauma and treatment effectiveness for children after a natural disaster. *Journal of the American Academy of Child and Adolescent Psychiatry, 25*, 357-363.

Giannopoulou, I., Dikaiakou, A., & Yule, W. (2006). Cognitive-behavioural group intervention for PTSD symptoms in children following the Athens 1999 earthquake: a pilot study. *Clinical Child Psychology and Psychiatry, 11*(4), 543-553.

Gidron, Y., Gal, R., Freedman, S., Twiser, I., Lauden, A., Snir, Y. (2001). Translating research findings to PTSD prevention: results of a randomized-controlled pilot study. *Journal of Traumatic Stress, 14*(4), 773-780.

Goenjian, A. K., Karayan, I., Pynoos, R. S., Minassian, D., Najarian, L. M., Steinberg, A. M. (1997). Outcome of psychotherapy among early adolescents after trauma. *American Journal of Psychiatry, 154*, 536-542.

Grant, S. M., Hardin, S. B., Pesut, D. J., & Hardin, T. (1997). Psychological evaluations, referrals, and follow-up of adolescents after their exposure to Hurricane Hugo. *Journal of child and Adolescent Psychiatric Nursing, 10*(1), 7-16.

Hoagwood, K. E. (2007). Implementing CBT for traumatized children and adolescents after September 11: Lessons learned from the Child and Adolescent Trauma Treatments and Services (CATS) project. *Journal of Clinical Child and Adolescent Psychology, 36*(4), 581-592.

Klingman, A. (1987). A school-based emergency crisis intervention in a mass school disaster. *Professional Psychology: Research and Practice, 18*, 604-612.

La Greca, A. M., & Silverman, W. K. (2009). Treatment and prevention of posttraumatic stress reactions in children and adolescents exposed to disasters and terrorism: What is the evidence? *Child Development Perspectives, 3*(1), 4-10.

Litz, B. T., & Maguen, S. (2007). Early intervention for trauma. *Friedman, Matthew J [Ed]*, 306-329.

Math, S. B., Tandon, S., Girimaji, S. C., Benegal, V., Kumar, U., Hamza, A. (2008). Psychological impact of the tsunami on children and adolescents from the andaman and nicobar islands. *The Primary Care Companion to the Journal of Clinical Psychiatry, 10*(1), 31-37.

Nagao, K., Okuno, M., & Shindou, E. (2001). Mental Symptoms Induced by a Massive Outbreak of Infectious Disease (Enterhemorragic Escherichia Coli 0157) in Elementary School Children: II. Six Cases of Delayed and Reactivated Stress-Related Disorders, Including PTSD. *Japanese Journal of Child and Adolescent Psychiatry, 42*(4), 315-322.

Nagao, K., Okuyama, M., Miyamoto, S., & Haba, T. (1995). Treating early mental health and post-traumatic symptoms of children in the Hanshin-Awaji earthquake. *Acta Paediatrica Japonica, 37*(6), 745-754.

Poijula, S., Kemppainen, P., Wahlberg, K. E., & Hakko, H. (in press). Early Crisis Intervention and Screening in School for Suicide-Bereaved Schoolmates. *Omega: Journal of Death and Dying*.

Poijula, S., Wahlberg, K. E., & Dyregrov, A. (2001). Adolescent suicide and suicide contagion in three secondary schools. *International Journal of Emergency Mental Health, 3*(3), 163-168.

Pynoos, R. S., & Eth, S. (1986). Witness to violence: the child interview. *Journal of the American Academy of Child and Adolescent Psychiatry, 25*, 306-319.

Pynoos, R. S., & Nader, K. (1988). Psychological First Aid and Treatment Approach to Children Exposed to Community Violence: Research Implications. *Journal of Traumatic Stress, 1*(4), 445-473.

Rivlin, E. (1988). The psychological trauma and management of severe burns in children and adolescents. *British Journal of Hospital Medicine, 40*(3), 210-215.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. (2010). Multiple session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews*(3), CD006869.

Salcioglu, E., & Basoglu, M. (2008). Psychological effects of earthquakes in children: prospects for brief behavioural treatment. *World Journal of Pediatrics, 4*(3), 165-172.

Schreier, H., Ladakakos, C., Morabito, D., Chapman, L., & Knudson, M. M. (2005). Posttraumatic stress symptoms in children after mild to moderate pediatric trauma: a longitudinal examination of symptom prevalence, correlates, and parent-child symptom reporting. *Journal of Trauma, 58*(2), 353-363.

Silverman, W. K., Ortiz, C. D., Viswesvaran, C., Burns, B. J., Kolko, D. J., Putnam, F. W. (2008). Evidence-based psychosocial treatments for children and adolescents exposed to traumatic events. *Journal of Clinical Child and Adolescent Psychology, 37*(1), 156-183.

Stuber, J., Fairbrother, G., Galea, S., Pfefferbaum, B., Wilson-Genderson, M., & Vlahov, D. (2002). Determinants of counseling for children in Manhattan after the September 11 attacks. *Psychiatric Services, 53*(7), 815-822.

Vila, G., Porche, L.-M., & Mouren-Simeoni, M.-C. (1999). An 18-month longitudinal study of posttraumatic disorders in children who were taken hostage in their school. *Psychosomatic Medicine, 61*(6), 746-754.

Yule, W., & Udwin, O. (1991). Screening child survivors for post-traumatic stress disorder: experiences from the 'Jupiter' sinking. *British Journal of Clinical Psychology, 30*, 131-138.

3 Evaluation of an Early Risk Screener for PTSD in Preschool Children after Accidental Injury

Kramer, D. N., Hertli, M. B., & Landolt, M. A. (2013). Evaluation of an early risk screener for PTSD in preschool children after accidental injury. *Pediatrics, 132(4), e945-e951*.

3.1 Abstract

Objectives: To evaluate the effectiveness and most powerful selection of predictors of an early screening tool for posttraumatic stress disorder (PTSD) in a sample of 87 two to six years old children after unintentional injury. *Methods:* The examined screener was administered within 6 to 13 days post-accident and consisted of (1) an adapted version of the Pediatric Emotional Distress Scale (PEDS), the PEDS-ES (PEDS-Early Screener), and (2) questions on five additional risk factors (pre-existing child behavioral problems; parental pre-existing chronic mental or physical illness; pre-traumatic life events in the family; parental feelings of guilt; parental posttraumatic stress). The *PTSD Semi-structured Interview and Observational Record for Infants and Young Children* served as criterion measure 6 months post-accident. A case was deemed positive when meeting criteria for full or partial PTSD. *Results:* Use of the PEDS-ES without the additional risk factors performed best, with good sensitivity (85%) and moderate specificity (63%) for full or partial PTSD. *Conclusions:* The PEDS-ES allows for successful early screening of pre-school children after single accidental trauma. It may be used within a stepped care model for early identification of individuals designated for possible secondary preventative interventions.

3.2 Introduction

Unintentional injuries are frequent among young children. In 2011, more than one tenth of all U.S. American children up to 6 years experienced at least one accidental trauma which needed to be treated in a hospital emergency department (National Center for Injury Prevention and Control, 2011). Besides the potential for physical impairment, accidental injuries lead to a significant number of children suffering from long-lasting posttraumatic stress disorder (PTSD; Le Brocque et al., 2010). Specifically, 6 months after a road traffic accident still 13.9% of pre-school children met criteria for PTSD (Meiser-Stedman et al., 2008). Likewise, 6 and 16 months after a burn injury, 10% (De Young et al., 2011a) and 13.2% (Graf et al., 2011) of young children had PTSD.

Unnoticed and/or untreated psychological maladjustment leads to an increased risk of long-term mental disorders and, consequently, to higher public health care costs and lost productivity (Ziegler, Greenwald, DeGuzman, & Simon, 2005). Therefore, it is of broad interest to identify children at high risk for long-term posttraumatic distress as early as possible. Accurate early risk estimation is the *sine qua non* for conducting well-directed secondary preventative psychological interventions. This is especially relevant, given a recent meta-analysis suggesting that secondary prevention may be helpful in children (Kramer & Landolt, 2011).

However, research on early screening instruments in pre-schoolers is in its own infancy. Although short measures for symptoms of traumatic stress are available (Pediatric Emotional Distress Scale (PEDS; Saylor et al., 1999); modified Child Behaviour Checklist – PTSD scale (Dehon & Scheeringa, 2006); Young Child PTSD Checklist (Scheeringa, 2010)) none has been evaluated in the early aftermath of a traumatic event. Conversely, for school-age children, 3 well-validated early screeners are available: (1) The Child Trauma Screening Questionnaire (CTSQ: 5 re-experiencing and 5 hyperarousal items; Kenardy et al., 2006); (2) the Screening Tool for Early Predictors of PTSD (STEPP: 8 risk factors for PTSD; Winston et al., 2003); (3) the Australian Version of the Screening Tool for Early Predictors of PTSD (STEPP-AUS: 5 predictors for PTSD, 2 dissociation symptoms present during the accident, and one acute stress symptom; Nixon et al., 2010). Based upon the validation of the above mentioned instruments for older children, an effective early screener for PTSD should address both acute symptoms (Kenardy et al., 2006; Nixon et al., 2010) and additional risk factors for PTSD (Nixon et al., 2010; Winston et al., 2003). However, it remains unclear whether these findings are transferable to younger children. Therefore, the aims of this study were (1) to evaluate the effectiveness of early screening of pre-school children to determine their risk of PTSD after unintentional injury and (2) to examine whether acute stress symptoms, additional risk factors, or a combination of both are the best predictors of PTSD at follow-up. We expected that a screening tool combining acute symptoms and additional risk factors would outperform the use of either component alone.

3.3 Methods

3.3.1 Participants and Procedures

The sample for the present study was enlisted within a randomized controlled trial on the effectiveness of early psychological interventions based on a stepped procedure. Prior to data collection, the study was approved by the local ethics committee. Recruitment was conducted between May 2010 and June 2012 by means of electronic hospital records. Children ages 2 to 6 years after road traffic or burn accidents were included if medically treated as outpatients or inpatients at University Children's Hospital in Zurich, Switzerland. Further inclusion criteria were Swiss residence and at least one German-speaking parent. Children were excluded in cases of severe head injury (Glasgow Coma Scale score < 9) or if there was previous evidence of intellectual impairment (physician's rating).

Participant flow is illustrated in Figure 14. If the child met inclusion criteria, and the parents agreed to participate by signing the written informed consent form, parents completed the screening questionnaire within 6 to 13 days post-accident (M=8.83, SD=1.58). A child was considered 'high risk' when either the cut-off score of the PEDS-ES (PEDS-Early Screener)

was exceeded (15) or at least one of the five risk factors was present. Otherwise, the child was allocated to the 'low risk' group. Children considered to be at high risk were randomly assigned either to receive specific psychological intervention or to be controls with medical treatment alone. For the current analysis, the former were excluded. All families were contacted for a follow-up assessment six months post-accident (M=183.08 days, SD=9.33 days).

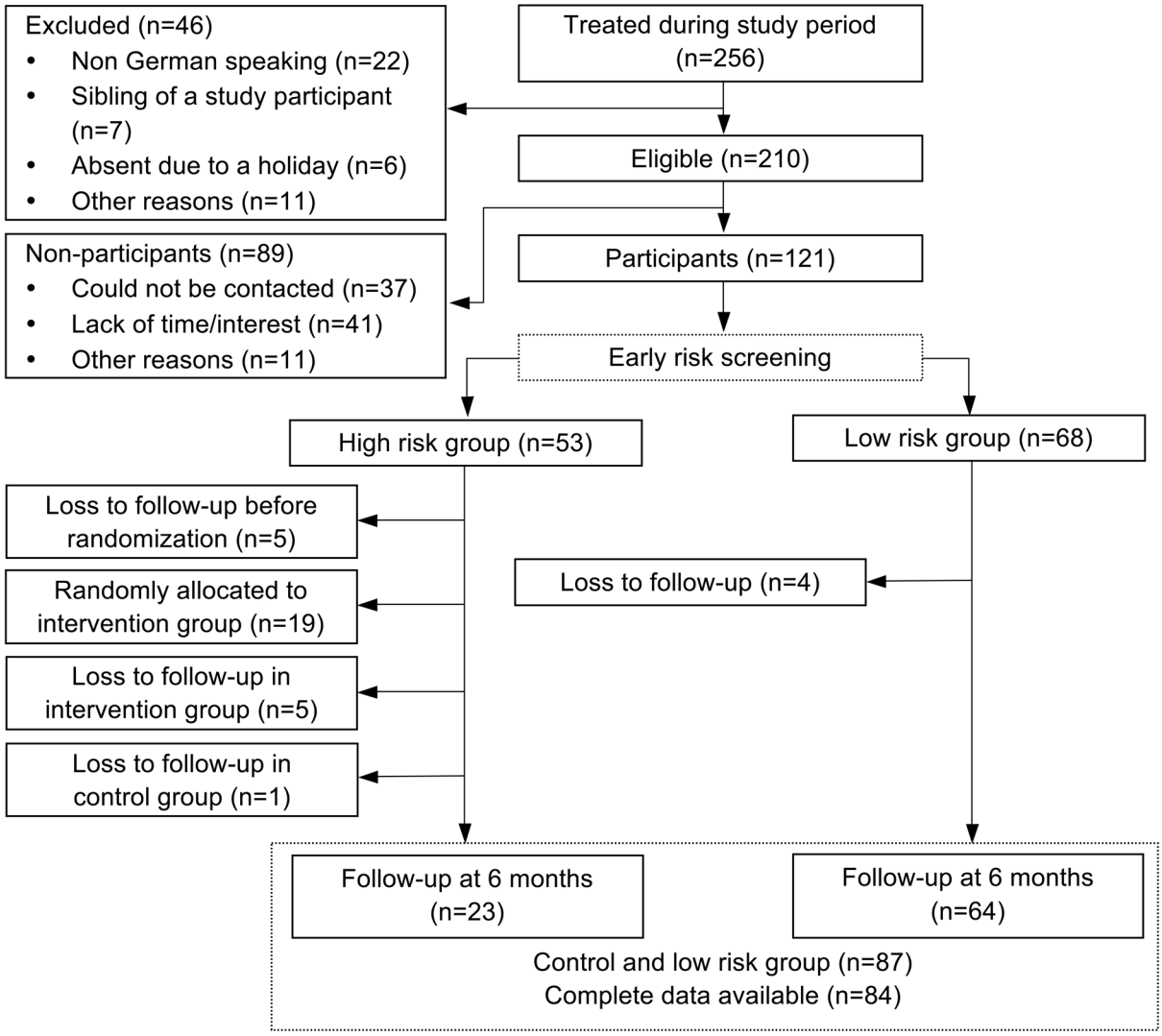

Figure 14.
Chart of participant flow

Of the 256 children treated during the study period, 46 (17.8%) were excluded (reasons see Figure 14). Ultimately, 121 of 210 (57.6%) families agreed to participate. Comparisons between non-participants and participants displayed no significant differences in age (t=.625, p=.533), sex (χ^2=.353, p=.552), outpatient vs. inpatient treatment (χ^2=.006, p=.938), type of accident (χ^2=.002, p=.964) or injury severity (t=-1.792, p=.075). However, significantly more Swiss (102/152) than non-Swiss subjects (17/53) agreed to participate (χ^2=19.802, p<.001).

The final sample size for evaluation of the screening instrument consisted of 87 children – 64 subjects at low risk and 23 individuals at high risk randomly allocated to the control condition (Figure 14).

3.3.2 Measures

3.3.2.1 PEDS-ES

To assess the child's symptoms of acute stress we administered the PEDS (Saylor et al., 1999), a parent-reported instrument that assesses the frequency of 21 problem behaviors. Each item is rated on a 4-point Likert-scale, ranging from 1 (*almost never*) to 4 (*very often*). The original validation study included both a trauma exposed and non-trauma exposed sample of 2 to 10-year old children (1999). Hereby, the PEDS was capable of correctly identifying 78% of children who had experienced a traumatic event. Internal consistency was α=.85 for the overall sample (1999). However, as the PEDS has never been administered in the immediate aftermath of a traumatic event, it has not yet been validated as an early screening instrument. Neither has its predictive performance ever been estimated.

For the present study, we used a German version of the PEDS that we translated according to international guidelines (Mallinckrodt & Wang, 2004). To ensure the measurement of reactive symptoms rather than pre-existing conduct problems, the scale's phrasing was altered to change sensitive wording: *equal or less often* (0), *a little more often* (1), *much more often* (2), and *very much more often* (3). This altered version of the PEDS was called the PEDS-ES (PEDS-Early Screener) (

Appendix 12). By adding up the values of each of the 21 items, a sum score was computed, ranging from 0 to 63. Acceptable internal consistency was identified (α=.76).

3.3.2.2 Additional risk factors

In addition to the PEDS-ES, five risk factors were assessed in accordance with current literature. Due to very limited evidence in pre-school children (De Young et al., 2011b), however, research in school-age children had to be additionally consulted to select important risk factors. The following risk factors were included: (1) pre-existing child behavioral problems (De Young et al., 2011b) (2) parental pre-existing chronic mental (De Young et al., 2011b) or physical (Houck et al., 2007) illness; (3) pre-traumatic life events in the family (Trickey et al., 2012); (4) parental feelings of guilt (Bakker et al., 2010); and (5) parental posttraumatic stress (De Young et al., 2011b).

Parents had to rate risk factors 1 and 2 dichotomously (*yes*/*no*), while factors 3 through 5 were judged on 4-point Likert-scales, ranging from 0 (*no effect*) to 3 (*large effect*), with regards to

the current effect of the problem on the family's or parent's life (Appendix 13). An answer was deemed positive when the current effect was rated no less than *"moderate"* (2).

3.3.2.3 PTSD

At 6 months, parents were interviewed with the German version (Irblich & Hepton, 2006) of the PTSD Semi-structured Interview and Observational Record for Infants and Young Children (PTSDSSI; Scheeringa & Zeanah, 2005). The PTSDSSI assesses both the DSM-IV(American Psychiatric Association, 2000) and the alternative criteria for PTSD in pre-school children (Scheeringa et al., 2005). For the latter, five items (recollections, flashbacks, diminished interests, detachment, and irritability) were alternatively worded to ensure developmental sensitivity for young children (Scheeringa et al., 2005). The preliminary draft of the 5th Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) proposes a subtype of PTSD in pre-school children (American Psychiatric Association, 2012). Compared to the alternative criteria (Scheeringa et al., 2005), items "inability to recall trauma" and "sense of foreshortened future" were deleted. Item "restricted affect", was limited to positive emotions. For this new DSM-5 algorithm, first studies (De Young et al., 2011a; Scheeringa et al., 2012) have identified good validity and developmental sensitivity. Consequently, this algorithm was used.

PTSD severity was computed by summing the number of symptoms present. Four symptoms were set as a clinically-relevant limit, because this cut-off was recently used as inclusion criterion within a randomized controlled trial (2011a). Partial PTSD was deemed present when two of the three clusters were apparent (Bryant & Harvey, 2002). In the present sample, Cronbach's alpha for the PTSDSSI's total number of symptoms was α=.82.

3.3.2.4 Demographics

Demographics were recorded either by asking parents or reviewing medical records. To compute socio-economic status (SES), paternal occupation and maternal education were assessed on 6-point ordinal scales and summed. Using this score, parents were allocated to a lower (2-5), middle (6-9) or upper social class (10-12); this measure is a proven valid indicator of SES (Landolt et al., 2002b). Injury severity was rated using the Modified Injury Severity Scale (Mayer, Matlak, Johnson, & Walker, 1980), ranging from 1 to 75.

3.3.3 Statistical Analyses

Data were analyzed using SPSS 20 (SPSS Inc., Chicago, IL). First, receiver operator curve (ROC) analysis was performed to indicate the area under the curve (AUC) as a measure of effect size and to compute sensitivity and specificity for different cut-off scores for full or partial PTSD. By examining the ROC-coordinates, the cut-off achieving highest sensitivity,

while maintaining reasonable specificity, was determined. Second, using the macro proposed by Domenech (2008), predictive performance – in terms of full or partial PTSD diagnosis and PTSD severity – was computed for all possible combinations of the PEDS-ES and the five additional risk factors. Predictive performance was indicated by sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV), along with 95% confidence intervals for each. Drop-out analyses were conducted using χ^2 and Student's *t*-tests.

3.4 Results

3.4.1 Sample Characteristics

Complete data for both risk screening and PTSDSSI parent-reports were available for 84 (97%) out of 87 participants. Details on sample characteristics are summarized in Table 24. Drop-out analyses revealed no differences in these sample characteristics between study completers and those lost to follow-up (data not shown). Twenty (23%) children met diagnostic criteria for full or partial PTSD six months post-trauma.

Table 24.
Demographical characteristics of the sample (N = 87)

Characteristics	*M* (*SD*) or *N* (%)	
Age (years)	3.82	(1.50)
Sex		
Male	52	(59.8)
Female	35	(40.2)
Socio-economic status		
Lower	5	(5.7)
Middle	38	(43.7)
Upper	35	(40.2)
Unknown	9	(10.3)
Type of accident		
Road traffic accident	23	(26.4)
Pedestrian	15	(65.2)
Bicycle/motorcycle	2	(8.7)
Car passenger	6	(26.1)
Burn	64	(73.6)
Fire	8	(12.5)
Fluid	32	(50.0)
Electricity	4	(6.3)
Contact	20	(31.3)
Medical treatment		
Inpatient	14	(16.1)
Outpatient	73	(83.9)
Days of hospital stay (inpatients only)		
Mean (*SD*)	7.93	(7.34)
Range	1-21	
Injury Severity		
Mean (*SD*)	2.10	(3.63)

3.4.2 ROC-Analysis

A cut-off score of 8 for the PEDS-ES was identified to enable maximum sensitivity (85%) and reasonable specificity (63%) to predict full or partial PTSD. In comparison, a value of 9 would have lowered sensitivity to 80% while increasing specificity to 67%, whereas a value of 7 would not have increased sensitivity, but decreased specificity to 53%. The ROC-curve is shown in Figure 15. The AUC was significantly greater than that predicted by chance (AUC=.79; 95% *CI*=.67-.90; $p<.001$).

3.4.3 Predictive Performance

Use of the PEDS-ES on its own achieved the best results for both sensitivity (85%) and specificity (63%) for full or partial PTSD, and for sensitivity (77%) and specificity (56%) for PTSD severity (Table 25). Adding the five supplemental risk factors to the PEDS-ES, sensitivity for full or partial PTSD and for PTSD severity remained stable, but specificity

decreased to 53% and 48%, respectively. Likewise, PPV and NPV decreased slightly when the risk factors were included. For the five risk factors without the PEDS-ES, the highest degree of sensitivity achieved was only 38% for PTSD severity; however, specificity was excellent, being roughly 80% for full or partial PTSD and PTSD severity. The results for combining all 5 risk factors, as well as the results for combining the PEDS-ES with all five risk factors are shown in Table 25.

For all outcomes, PPV was low, ranging from 21% to 41%. NPV was universally high, with highest values for full or partial PTSD (93%) and PTSD severity (93%) predicted by the PEDS-ES alone. Administering the PEDS-ES alone resulted in 51% of the patients being classified as at low risk for long-term PTSD.

3.5 Discussion

The present study is the first to evaluate an early screening instrument for PTSD risk in pre-school children after accidental trauma. The examined instrument consisted of an adapted version of the PEDS (Saylor et al., 1999), the PEDS-ES, and five additional risk factors (pre-existing child behavioral problems; parental pre-existing chronic mental or physical illness; pre-traumatic life events in the family; parental feelings of guilt; parental posttraumatic stress). We hypothesized that combining the PEDS-ES with the risk factors would improve screening accuracy for PTSD, relative to the isolated use of either. Surprisingly, this hypothesis was not affirmed: the PEDS-ES performed best when used alone. Given the evidence in school-age children that acute stress reactions have a large influence on later PTSD (Trickey et al., 2012), the good predictive power of the PEDS-ES is not that surprising.

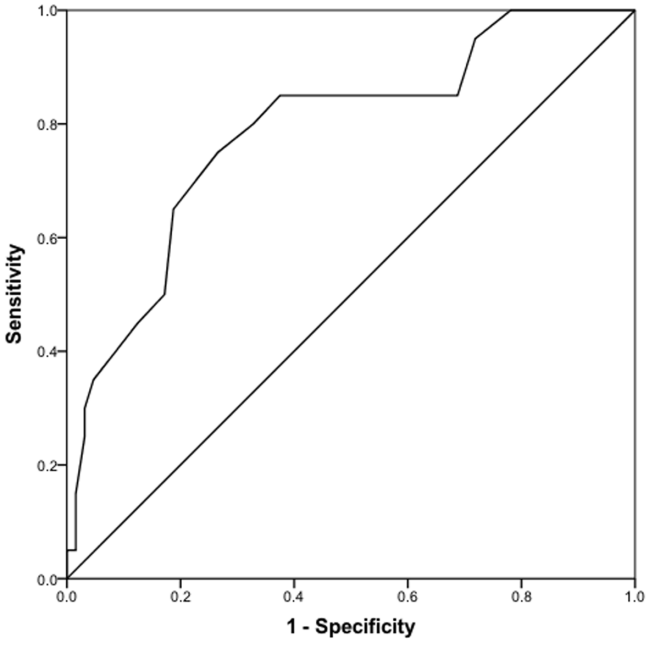

Figure 15.
ROC curve for the predictive performance by cut-off score for full and partial PTSD at 6 months.

For instance, including variables like witnessed life threat to a caregiver, family functioning, or parenting skills might have enhanced the predictive power of the risk factors (De Young et al., 2011b; Graf et al., 2011). Third, to our knowledge, only one study (Graf et al., 2011) has investigated predictors for PTSD in a similar sample of children with accidental injuries.

Hence, the previously reported risk factors in the literature on pre-school children might not be generalizable to injured children. Fourth, the current prospective study's findings on the relative unimportance of the examined risk factors question the mainly cross-sectional previous research in this field in pre-school children (De Young et al., 2011b). For the present sample, the PEDS-ES alone was both highly sensitive (85%) and acceptably specific (63%) for full or partial PTSD. Likewise, PPV (41%) and NPV (93%) were reasonable in combination. These results are clearly comparable to the findings for early screening measures for school-age children after accidental injuries: for instance, sensitivity has ranged from 82% for the CTSQ (Kenardy et al., 2006) to 89% for the STEPP-AUS (Nixon et al., 2010). Meanwhile, specificity has exhibited a broader range, from 48% for the STEPP-AUS (Nixon et al., 2010) to 74% for the CTSQ (Kenardy et al., 2006). While PPV has been as low as 23%, 24% and 25% for the CTSQ (Kenardy et al., 2006), the STEPP-AUS (Nixon et al., 2010) and the STEPP (Winston et al., 2003), respectively, NPV has been excellent for all three of these screening tools (CTSQ: 98% (Kenardy et al., 2006); STEPP-AUS: 98% (Nixon et al., 2010); STEPP: 95% (Winston et al., 2003)).

Table 25.
Predictive performances for full or partial PTSD and PTSD severity at 6 months

	Proposed DSM-5 PTSD Criteria for Pre-school Children											
	PEDS-ES (cut-off ≥ 8)				Five risk factors				PEDS-ES (cut-off ≥ 8) with five additional risk factors			
	Full or partial PTSD		Symptom severity[a]		Full or partial PTSD		Symptom severity[a]		Full or partial PTSD		Symptom severity[a]	
	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present	Absent	Present
Positive[b] n (%)	24 (29)	17 (20)	31 (37)	10 (12)	13 (15)	7 (8)	15 (18)	5 (6)	30 (36)	17 (20)	37 (44)	10 (12)
Negative n (%)	40 (48)	3 (4)	40 (48)	3 (4)	51 (61)	13 (15)	56 (67)	8 (10)	34 (40)	3 (4)	34 (40)	3 (4)
Sensitivity [95% CI[c]]	.85 [.64, .95]		.77 [.50, .92]		.35 [.18, .57]		.38 [.18, .64]		.85 [.64, .95]		.77 [.50, .92]	
Specificity [95% CI[c]]	.63 [.50, .73]		.56 [.45, .67]		.80 [.68, .88]		.79 [.68, .87]		.53 [.41, .65]		.48 [.37, .59]	
PPV[d] [95% CI[c]]	.41 [.28, .57]		.24 [.14, .39]		.35 [.18, .57]		.25 [.11, .47]		.36 [.24, .50]		.21 [.12, .35]	
NPV[e] % [95% CI[c]]	.93 [.81, .98]		.93 [.81, .98]		.80 [.68, .88]		.88 [.77, .94]		.92 [.79, .97]		.92 [.79, .97]	

[a] Cut-off ≥ 4 symptoms
[b] Positive, when at least one of the risk factors was present
[c] 95% Confidence Interval
[d] Positive Predictive Value
[e] Negative Predictive Value

Despite good sensitivity for full or partial PTSD, PPVs were no better than mediocre. This means that, while more than four of the five children who potentially needed help would receive it, only 41% of those receiving help actually would need it. NPV and PPV are the indicators of interest for predicting whether or not a screening instrument is able to correctly diagnose an individual. One might argue that any screening measure with a PPV as low as 40% is ineffective. However, it must be taken into consideration that first**,** the validity of PPV and NPV is limited, as both depend upon the criterion-in-question's prevalence in the sample being tested. As prevalence of full or partial PTSD in the present sample was rather low

(23%), it is inevitable that low PPV and high false positive rates would result, even if the instrument's sensitivity and specificity are high (Altman & Bland, 1994). Consequently, an instrument's PPV must be interpreted while considering the examined sample's prevalence rates. Moreover, one may speculate that the PEDS-ES would even perform better in a sample with higher morbidity. Hence, the PEDS-ES's predictive performance is probably rather under- than overestimated. Second, a screening instrument's main purpose is to identify individuals who potentially need a specific treatment. Thus, sensitivity and specificity would be the appropriate indicators. This raises the question whether a specificity of 63% is effective. Given that a recent meta-analysis (Kramer & Landolt, 2011) showed that secondary prevention may be helpful in children and does not do any harm, moderate specificity is rather an economic than a health concern.

In summary, isolated use of the PEDS-ES performed well for full or partial PTSD. However, for PTSD severity, performance was merely moderate. Consequently, in clinical practice, we recommend that the PEDS-ES be used as stand-alone early screening tool. Notably, prediction should mostly be made for full or partial PTSD. Finally, the PEDS-ES proved to be both an economically and clinically valid screening instrument. On one hand, 51% of children would screen negative and, therefore, likely not receive unnecessary early psychological support, which would significantly lower the costs of psychological treatment. Thus, the PEDS-ES can be used within a stepped-care model for early identification of pre-school children for whom early psychological support should be provided. On the other hand, a sensitivity of 85% indicates that fewer than one in five children demonstrating full or partial PTSD six months after an accident will be missed for early intervention. Because of the low PPV, clinicians should carefully communicate to parents that the present screening instrument is not meant for diagnostic purposes: even with a positive test result, six months after an accident, only 41% of children still suffered clinically-relevant symptoms. For the clinician, it is good to know that, by applying the PEDS-ES, more than four fifths of children exhibiting either full or partial PTSD six months post-trauma can be identified accurately at a very early stage after trauma.

3.6 Study Limitations

Although this is the first study to successfully evaluate an early screener in a homogeneous sample of accidentally-injured pre-school children, some limitations merit note. First, our sample was small, jeopardizing its representativeness. To better generalize the results, the PEDS-ES must be reevaluated in larger samples and with other types of trauma (e.g., assaults or natural disasters).

Second, the generalizability of our results may be limited due to the low response rate. A possible reason for this response rate could be that the present study was primarily an

intervention study; as such, parents might have been discouraged by the large commitment required for participation. Notably, previous studies on early screening instruments in school-age children have yielded very similar response rates (Kenardy et al., 2006; Nixon et al., 2010).

Third, significantly fewer non-Swiss than Swiss families participated in the study. Although parents provided other reasons for non-participation than insufficient German language skills, nevertheless, this might have been an important reason. Therefore, the present findings must be applied with caution to individuals who have immigrated from foreign countries.

3.7 Conclusions

This study has been the first to evaluate an early screening instrument assessing the risk of developing long-term PTSD in pre-school children after a single accidental injury. Analyses revealed that assessing acute stress symptoms alone is the best predictor of full or partial PTSD six months post-accident. Thus, with the PEDS-ES, a short, valid, and reliable screening instrument is in clinicians' hands. We suggest using the PEDS-ES within a stepped care model for early identification of pre-school children for whom early psychological interventions should be provided.

3.8 Acknowledgements

We acknowledge the kind cooperation of all the parents and children who participated in this study.

4 Early Psychological Intervention in accidentally-injured Children ages 2-16 Years: A Randomized Controlled Trial

Kramer, D. N., & Landolt, M. A. (submitted). Early psychological intervention in accidentally-injured children ages 2-16 years: a randomized controlled trial.

4.1 Abstract

Background: Road traffic accidents and burns are frequent events in children. Although many children recover spontaneously, a considerable number develops long-term psychological sequelae. Evidence on early interventions to prevent such long-term problems is still scarce for school-age children and completely lacking for pre-school children. *Objectives:* To evaluate the efficacy of an early psychological intervention in 108 children ages 2-16 years after unintentional injury. *Methods* Children at risk for the development of posttraumatic stress disorder (PTSD) were randomly assigned to either a control or intervention group. Primary outcomes were PTSD, behavior problems and depression symptoms. Pre-treatment and blinded 3- and 6-months follow-up assessments were conducted. *Results:* In pre-school children, no intervention effects were found. School-age children in the intervention group exhibited significantly fewer internalizing problems at 3-months follow-up relative to controls and an almost significant time-by-group effect for PTSD intrusion symptoms was found (p=.06). *Conclusions:* This is the first study examining the efficacy of an early intervention among both school-age and pre-school age children. Since the intervention was ineffective for young children, "watchful waiting" may be best practice for this age-group. For school-age children, the intervention might be used in a step-wise manner in pediatric injury care.

4.2 Introduction

Road traffic accidents (RTA) and burns are frequent events in children. In 2011, roughly 19% and 28% of all non-fatal RTAs and burns in the U.S. involved children (National Center for Injury Prevention and Control, 2011). In addition to the physical threat, children may also be psychologically traumatized after unintentional injuries. For instance, after an RTA, 10% of pre-school children (Meiser-Stedman et al., 2008) and 13% of school-age children (Olofsson et al., 2009) suffer from Posttraumatic Stress Disorder (PTSD). In another study, PTSD prevalence after burn injuries affected 13% of pre-school children (Graf et al., 2011) and almost 19% of school-age children (Landolt et al., 2009a). Besides PTSD, children may also suffer from other persistent psychological problems after RTAs and burns, such as emotional and behavioural problems (De Young et al., 2012; Gillies, Barton, & Di Gallo, 2003). Fortunately, spontaneous recovery in children is common (De Young et al., 2012). Consequently, not all injured children need psychological support after acute trauma. Targeted preventative care is therefore a reasonable approach that is also time- and cost-effective.

To successfully provide targeted care, reliable and valid screening instruments with good predictive values are required, like the Child Trauma Screening Questionnaire (CTSQ;

Kenardy et al., 2006) and Pediatric Emotional Distress Scale–Early Screener (PEDS-ES; Kramer, Hertli, & Landolt, 2013).

A recent meta-analysis examined the characteristics and efficacy of early psychological interventions in children after single trauma (Kramer & Landolt, 2011). The interventions had to be carried out within four weeks post-accident to be considered for inclusion. Seven studies were finally included wherefrom four were randomized trials. Study quality varied greatly between the studies. Sample sizes ranged from 24 to 158 children ages 7 to 18 years. Trauma types were very heterogeneous (e.g. unintentional injuries, physical or sexual abuse, or classmate's suicide).

Merging the samples of all included studies, the number of PTSD diagnoses did not differ significantly between intervention and control condition (Kramer & Landolt, 2011). With respect to the single studies, only the intervention of Berkowitz, Stover, & Marans (2011) could reduce the rate of PTSD diagnoses. The meta-analysis revealed beneficial mean effect sizes of early interventions in school-age children for dissociation, anxiety and arousal. However, considering the included studies separately, results were very heteorgeneous with some studies finding no intervention effects at all (Kramer & Landolt, 2011). Despite these inconsistencies, the following components of an intervention were deemed important: psycho-education, training of individual coping-skills, presence of at least one parent, and most probably trauma exposure. Previous research also suggests that multiple and age-adjusted sessions within the framework of a step-wise protocol where only children at high risk for long-term psychological maladjustment are provided with psychological support should be provided to children at risk (Kramer & Landolt, 2011). Although many pre-school age children suffer major unintentional injuries, no studies on early psychological interventions are available for this age-group, meaning that methodologically-sound intervention studies are desperately needed.

The objective of this randomized controlled trial (RCT) was to examine the efficacy of a manualized and age-adjusted two-session early psychological intervention, both for pre-school and school-age children with accidental injuries. We hypothesized that children receiving the intervention would report fewer PTSD symptoms and behavioral problems three and six months post-injury, compared to children given standard medical treatment. Additionally, for school-age children in the intervention group, a significant decrease in depression symptoms was expected.

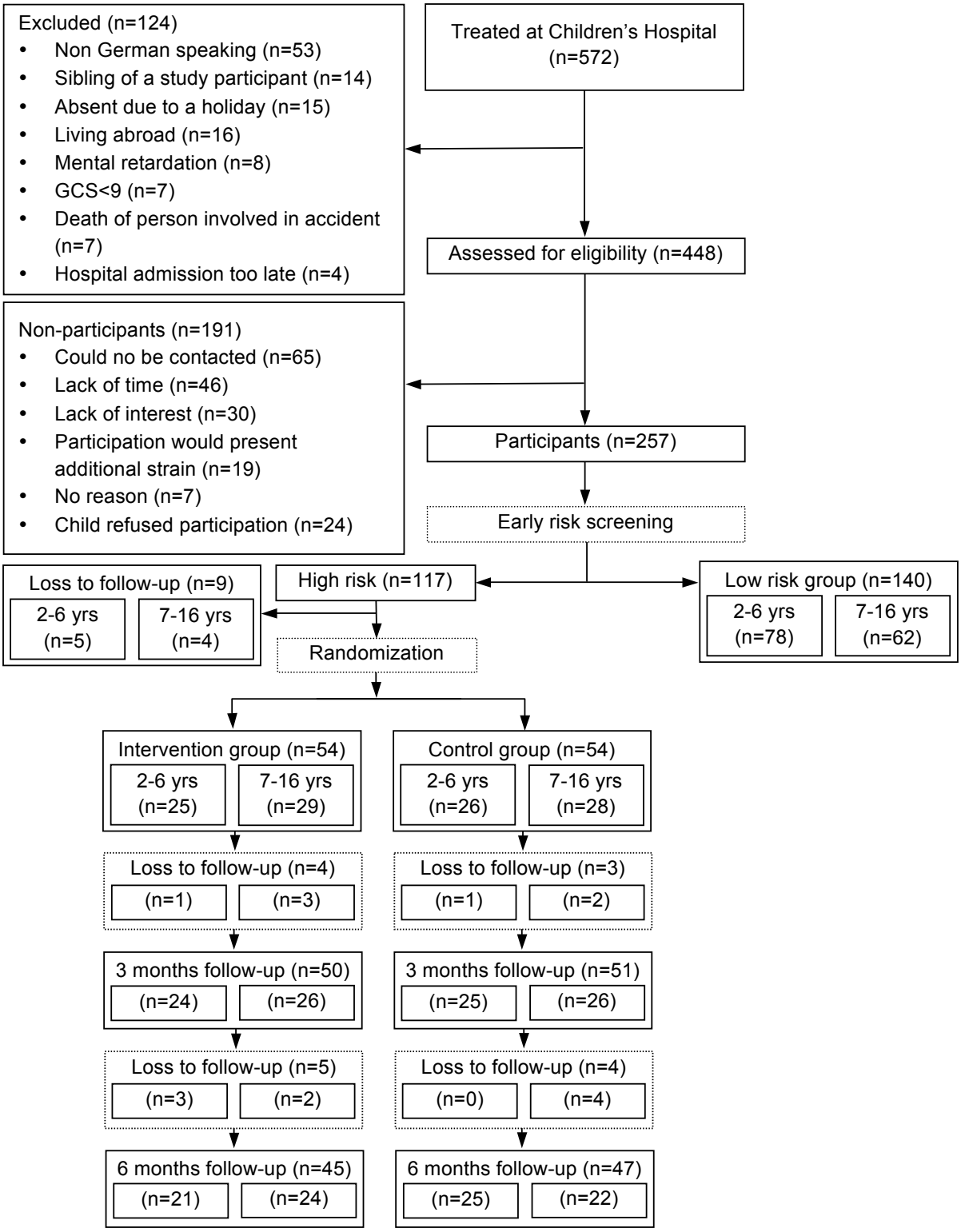

Figure 16.
Participant flow chart

4.3 Methods

4.3.1 Participants

Children and adolescents were recruited if all of the following criteria were met: (1) age 2-16 years, (2) Swiss residence, (3) medical treatment (in- or outpatient) after an RTA or burn, (4) at least one German-speaking parent and fluency in German for children ages 7-16 years, (5) no severe head injury (Glasgow Coma Scale <9), and (6) no prior intellectual impairment (physician's rating).

Participant flow is illustrated in Figure 16). Of the 572 children treated during the study period, 124 were excluded (Figure 16). Another 191 could not be contacted or refused participation. Participants and non-participants did not differ in age (t=0.48, p=.63), sex (χ^2=0.28, p=.60), type of accident (χ^2=2.37, p=.12), or type of medical treatment (inpatient vs. outpatient; χ^2=2.04, p=.15). Significantly more non-Swiss individuals declined participation (χ^2=26.49, p<.001). Participants had significantly longer hospital stays if treated as inpatients (t=-3.47, p<0.01) and were more severely injured (t=-3.00, p<0.01) than non-participants.

Of the 448 children assessed for eligibility, 257 children were screened for risk (response rate 57.4%). Of the children screened, 117 (45.5%) were allocated to the high-risk group. Nine individuals dropped out of the study before randomization because they cancelled participation (n=1) or could not be contacted (n=8). The remaining 108 children were randomly assigned to either the control (n=54) or intervention group (n=54). Children in the control group received standard medical care, while children in the intervention group also received a 2-session early intervention (see below). All individuals in the intervention group completed both treatment sessions. Follow-up assessments with all data collected were completed for 47 (87.0%) and 45 (83.3%) children in the control and intervention group at three (T1) and six months (T2), respectively (Figure 16). Of the 108 children randomized, 16 (14.8%) dropped out of the study: nine (16.7%) from the intervention and seven (13.0%) from the control condition.

4.3.2 Procedures

The study was approved by the local ethics committee and enlisted as a registered RCT (NCT01085370). Via electronic hospital records, children were continuously recruited between May 2010 and September 2012 at University Children's Hospital Zurich in Switzerland. If a child met inclusion criteria, the family was approached within the first week of the child's accident. After written informed consent was obtained, screening was performed as soon as possible (either by phone or face-to-face). With families contacted by

telephone, the parent's screening questionnaire was administered via an interview. In addition to the parent's screening questionnaire, children ages 7-16 years were interviewed with a short screening measure of PTSD risk (either by phone or face-to-face). All screening interviews were carried out by the first author. The screening measures are described below. Parents and school-age children completed the screening questionnaire within 5-19 days of the accident (Parents: *M*=8.72, *SD*=1.73 days, 86.4% within 10 days; Child: *M*=8.77, *SD*=2.01 days, 85.2% within 10 days). Children who screened positive were eligible for the RCT and a separate appointment was scheduled (at the hospital or family's home) for 10 to 16 days post-accident. During this appointment, with the child and at least one parent present, the standardized baseline assessment (T0) was performed. Either a parent (for 2-6 year-old children) or the child (7-16 year-old children) was interviewed by the first author. Additional questionnaires were handed out to the parents to be completed and returned by mail after the session (see below). Immediately following the baseline interview, a sealed envelope was opened to reveal random assignment to either the control or intervention group. The randomization list was stratified by child sex and age and generated by the software RANCODE 3.6 (IDV, Gauting, Germany). Directly after the baseline (T0) interview, the intervention was administered to those families randomized to receive the intervention. The second intervention session was completed two weeks later. Children randomized to the control group received standard medical care. The baseline interview and session 1 of the intervention took place approximately two weeks after the child's accident (*M*=13.74, *SD*=3.35 days), with session 2 roughly two weeks after session 1 (*M*=15.63, *SD*=5.33 days). T1 and T2 follow-up assessments were usually conducted approximately three and six months after the accident (T1: *M*=94.90, *SD*=13.23 days; T2: *M*=184.69, *SD*=13.23 days) in the family's home. The first author performed all recruitment, baseline interviews, and the intervention. Interviewers who conducted the follow-up interviews were Masters or Doctoral level students blinded to treatment arm. In return for participation, each child received 20 (low-risk group) or 50 (high-risk group) Swiss Francs after completing all assessments.

4.3.3 Measures

4.3.3.1 Screening Measures

To identify pre-school children at risk for persistent traumatic stress, the PEDS-ES (Kramer et al., 2013) was used. The PEDS-ES is a parent-reported instrument assessing the frequency of 21 reactive symptoms and behaviors rated on 4-point Likert-scales (0-3). We used the PEDS' original cut-off of >15 (Kramer et al., 2013). In the present sample, internal consistency of the scale was acceptable (α=.76). Additionally, parents were asked questions on further risk factors (for details, see Kramer et al., 2013). A pre-school child was considered to be at risk if

either the PEDS' original cut-off (>15) was surpassed or one of the additional risk factors present.

For school-age children, the German version (TSK/10; Haas & Goldbeck, 2010) of the CTSQ (Kenardy et al., 2006) was administered. This measure assesses the presence of ten PTSD symptoms (*yes*/*no*). Using a cut-off score of ≥5, good sensitivity (82%) and specificity (74%) for PTSD symptoms has been reported (Kenardy et al., 2006). Internal consistency in the present sample was α=.65, which is low but comparable to that reported by Kenardy et al. (2006). Additionally, each child was asked to rate his/her current distress with regards to guilt or life-threat during the accident on a 4-point Likert-scale (0-3). Parents were asked the same questions about additional risk factors as the parents of pre-school children (for details, see Kramer et al., 2013). The child was classified as at risk if either one risk factor was present, the CTSQ cut-off of ≥5 was surpassed, or one of the two additional questions asked to the child scored ≥2.

4.3.3.2 Acute and Posttraumatic Stress Symptoms

In pre-school children, accident-related posttraumatic stress symptoms were assessed using the German version (Irblich & Hepton, 2006) of the *PTSD Semi-structured Interview and Observational Record for Infants and Young Children* (PTSDSSI; Scheeringa & Zeanah, 2005). The PTSDSSI assesses both the DSM-IV and alternative criteria for PTSD in pre-school children (Scheeringa et al., 2003). For the latter, five items (recollections, flashbacks, diminished interests, detachment, and irritability) were alternatively worded to ensure developmental sensitivity for young children (Scheeringa et al., 2003). Contrary to the DSM-IV algorithm, the alternative algorithm requires only one avoidance/numbing criterion (Scheeringa et al., 2003). Psychometric properties were previously reported as good (Scheeringa et al., 2003). In the present sample, Cronbach's α was good at T0/T2 (α=.84) and acceptable at T1 (α=.77).

In school-age children, accident-related acute stress symptoms were assessed using the German version (CAB; Fruhe et al., 2008) of the *Acute Stress Checklist for Children* (Kassam-Adams, 2006), which consists of 26 items assessing acute stress symptoms, rated on 3-point Likert-scales (0-2). The instrument assigns a diagnosis of Acute Stress Disorder (ASD) according to the DSM-IV. The CAB was conducted as a structured interview with the child. Internal consistency in the current sample was good (α=.87).

The German version (IPS-P-KJ; Steil & Füchsel, 2006) of the *Clinician-Administered PTSD Scale for Children and Adolescents* (CAPS-CA; Nader et al., 2002) was used to assess the diagnosis and symptoms of PTSD in school-age children according to DSM-IV criteria. Good psychometric properties were reported (Steil & Füchsel, 2006). Symptom frequency and

intensity are scored on 5-point Likert-scales (0-4). Our Cronbach's α values were excellent (T1: α=.95; T2: α=.94).

Given that no instruments currently exist to assess pre-schooler ASD symptoms, the PTSDSSI-D was also used at T0. ASD/PTSD number of symptoms was computed by summing the number of symptoms present in each scale. According to manual guidelines, for both the PTSDSSI-D and CAB an item was considered present when rated ≥1, and for the IBS-P-KJ when frequency ≥1 and intensity ≥2. A full ASD/PTSD diagnosis was based on the alternative algorithm for pre-school children (Scheeringa et al., 2005) and diagnosed according to the DSM-IV for school-age children.

4.3.3.3 Behavioral Problems

Behavioral problems were assessed with the German versions of the *Child Behavior Checklist* (CBCL) for pre-school (CBCL 1½-5 (100 items); Arbeitsgruppe Deutsche Child Behavior Checklist, 2002) and school-age children (CBCL/4-18 (120 items); Steinhausen et al., 1996), both parental proxy-report questionnaires with excellent psychometric properties (Achenbach & Rescorla, 2000; Steinhausen et al., 1996). Each item is coded on a 3-point Likert-scale (0-2). For the present study, the three broadband-scales for total, internalizing, and externalizing problems were used.

Since no Swiss or German reference data are available for pre-school children, U.S. reference data were used (T-values; Achenbach & Rescorla, 2000). In the present sample, internal consistency for the Total Scale was excellent (T0: α=.94; T1: α=.96; T2: α=.94), acceptable to excellent for the Internalizing Problems Scale (T0: α=.77; T1: α=.90; T2: α=.84) and good to excellent for the Externalizing Problems Scale (T0: α=.87; T1: α=.92; T2: α=.90).

For school-age children, raw data were transformed into T-scores, based on a Swiss community reference sample (Steinhausen et al., 1996). In the present study, internal consistency for the Total Scale was excellent (T0: α=.94; T1: α=.93; T2: α=.94), and good to excellent for internalizing (T0: α=.88; T1: α=.87; T2: α=.91) and externalizing problems (T0: α=.88; T1: α=.85; T2: α=.92),

4.3.3.4 Depression Symptoms

The number of depression symptoms was assessed in school-age children via the German version (DIKJ; Stiensmeier-Pelster, 2000) of the *Children's Depression Inventory* (CDI; Kovacs, 1985). Each of the 26 items is scored on a 3-point Likert-scale (0-2). By summing these scores, a total score was generated. German reference data (T-values) were used (Stiensmeier-Pelster, 2000). Good psychometric properties were reported (Stiensmeier-

Pelster, 2011). In the present sample, Cronbach's α values were good to excellent (T0: α=.84; T1: α=.90; T2: α=.89).

4.3.3.5 Subjective intervention evaluation

To evaluate the participants' perception of the intervention, mothers and school-age children were asked at 6-months follow-up whether or not they read the brochure. In addition, they were asked to rate the perceived helpfulness of the psycho-education leaflet and the intervention on 5-point Likert-scales, ranging from *not helpful* (0) to *very helpful* (4). Ratings of perceived distress caused by the intervention were assessed on a 5-point Likert-scale, ranging from *not distressing* (0) to *very strongly distressing* (4).

4.3.3.6 Demographics and medical variables

Demographics were retrieved from hospital records. To compute socio-economic status (SES), paternal occupation and maternal education were assessed on 6-point ordinal scales and summed. Using this score, parents were allocated to the lower (2-5), middle (6-9) or upper social class (10-12); this measure is a proven valid indicator of SES in Switzerland (Landolt et al., 2002b). Injury severity was rated using the Modified Injury Severity Scale (Mayer et al., 1980), ranging from 1 to 75, with higher scores indicating more severe injury.

4.3.4 Standard medical care

Standard medical care, including clinical diagnostics and comprehensive medical treatment, was provided to all 572 children. Depending on the child's injury, staff members from different disciplines were available for treatment (surgeons, paediatricians, physical therapists, etc.). Although not routinely provided, psychological support also was available. In the present study, families of 10 pre-school and 17 school-age children received additional psychological support. The control and intervention groups did not differ in the number of psychological therapy sessions (Table 26) or type of psychological support (psychoeducation, p=.39; training of coping strategies, p=1.00; exposure by trauma narrative, p=.86).

4.3.5 Early Psychological Intervention for Children and Parents (EPICAP)

Early Psychological Intervention for Children and Parents (EPICAP) is a further development of the cognitive-behavioral intervention evaluated by Zehnder et al. (2010). They provided a single-session intervention to 7-16 years old children after a road traffic accident following a structured, four-step process. First, the accident was reconstructed in detail by means of drawings and accident-related toys. Second, dysfunctional accident-related appraisals were identified and the child was supported in modifying them. Third, psychoeducation on common acute stress reaction was provided to normalize the child's stress symptoms and coping skills for dealing with these reactions were discussed. Fourth, a leaflet was handed out

containing written information on posttraumatic stress and a contact address. Drawing on their results and the meta-analysis by Kramer and Landolt (2011), the initial intervention was modified in three ways: (1) patients participated in two sessions instead of one to spend more time on individual coping strategies; (2) the trauma narrative was age-adjusted; and (3) an intervention manual for pre-school children was created. The concept of three components was maintained. In component 1, detailed reconstruction of the accident was performed: while children ages 2-11 years reconstructed the accident using toy figures, adolescents utilized less-childlike items (e.g., small model cars and simple wooden figures). Although children ages ≤6 years were encouraged to retell the accident by themselves, some needed to be supported by their caregiver (i.e., the caregiver led the narration while the child watched). Previous findings suggest that incomplete trauma memory has a large impact on the initial development of PTSD (Stallard & Smith, 2007). Consequently, construction of a trauma narrative might be essential in the early aftermath of a traumatic event. Accordingly, trauma reconstruction in the EPICAP intervention was aimed at constructing a functional trauma memory. Moreover, children and parents were intended to be exposed to the trauma during trauma reconstruction.

In component 2, during session 1, psycho-education on child acute stress reactions and *general* age-appropriate coping strategies (e.g. talking about the accident or reestablishing daily routines in the child's life) were provided orally and in written form to parents and school-age children (leaflet). This information aimed to normalize posttraumatic stress reactions and help the child to cope with symptoms. For pre-school children, parents were instructed on how to cope with their child's stress reactions.

During component 3, the child practiced age-appropriate and standardized coping skills for each of their current PTSD symptoms (e.g., relaxation skills or exposure strategies).

Components 1 and 2 were part of session 1, while component 3 was provided in session 2. During the intervention, at least one parent had to be present. The EPICAP-manual is available upon request. All intervention sessions were provided by the first author and supervised by the last author. Hence, the procedure was identical for all individuals in the intervention group.

4.3.6 Statistical Analyses

Data were analyzed using SPSS 20 (SPSS Inc., Chicago, IL). First, descriptive analyses for demographics and drop-out analyses were conducted. All analyses were performed with 2-sided tests and a p-value <.05 was considered significant. Nominal variables were analyzed using the χ^2-test or Fisher's exact test. For continuous data, Student's t-tests were used.

Statistical analyses were conducted for the pre-school and school-age children separately because different outcome measures with incommensurable scales were administered.

Table 26.
Comparison of demographic and medical characteristics between intervention and control groups (N=108)

	2-6 years						7-16 years					
	M (SD) or N (%)						M (SD) or N (%)					
Characteristics	Intervention Group		Control Group		t or χ^2	p	Intervention Group		Control Group		t or χ^2	p
Sample size	25	(46.3)	26	(48.1)	-	-	29	(53.7)	28	(51.9)	-	-
Age (years)	4.10	(1.29)	4.44	(1.69)	0.81	.43	11.00	(2.46)	11.01	(2.73)	0.02	.99
Sex												
Male	15	(60.0)	15	(57.7)			21	(72.4)	20	(71.4)		
Female	10	(40.0)	11	(42.3)	0.03	.87	8	(27.6)	8	(28.6)	0.01	.93
Socio-economic status												
Lower	2	(8.0)	2	(7.7)			0	(0.0)	0	(0.0)		
Middle	9	(36.0)	10	(38.5)			14	(48.3)	20	(71.4)		
Upper	7	(28.0)	9	(34.6)	0.07	.97	14	(48.3)	5	(17.9)	5.17	.02
Unknown	7	(28.0)	5	(19.2)			1	(3.4)	3	(10.7)		
Mean score (SD)	8.67	(2.45)	8.90	(2.68)	0.29	.78	9.54	(1.60)	8.24	(1.45)	-3.08	.03
Type of accident												
RTA	9	(36.0)	8	(30.8)			18	(62.1)	22	(78.6)		
Burn	16	(64.0)	18	(69.2)	.16	.69	11	(37.9)	6	(21.4)	1.85	.17
Medical treatment												
Inpatient	11	(44.0)	9	(34.6)			17	(58.6)	18	(64.3)		
Outpatient only	14	(56.0)	17	(65.4)	0.47	.49	12	(41.4)	10	(35.7)	0.19	.66
Additional psychological support within standard care												
No	20	(80.0)	21	(80.8)			20	(69.0)	20	(71.4)		
Yes	5	(20.0)	5	(19.2)	-[a]	.61	9	(31.0)	8	(28.6)	0.041	.84
Days of hospital stay (inpatients only)	8.64	(9.14)	7.56	(7.94)	-2.79	.78	18.65	(25.31)	10.44	(12.73)	-1.20	.24
Injury Severity Score	4.20	(5.93)	2.19	(3.41)	-1.49	.14	7.24	(9.68)	5.64	(6.87)	-0.72	.48

Note: RTA = Road traffic accident.
[a] *Fisher's exact test was used*

Number of PTSD symptoms and PTSD diagnosis (*yes*/*no*) were the primary outcomes of interest. Secondary outcomes were child internalizing and externalizing problems (for ages 2-16 years) and depression symptoms (for ages 7-16 years). Pre- to post-treatment changes in primary and secondary outcomes were analyzed using univariate analyses of covariance (ANCOVAs). Baseline scores for the dependent variables were included as covariates. Time-by-group interactions and *post-hoc* Student's *t*-tests were used for all follow-up time points to indicate whether the change over time was different between groups. *Standard mean differences* (SMD) were computed based upon the marginal means and standard errors estimated by ANCOVA. Negative SMDs indicate that the intervention group was superior to controls. The magnitude of the SMD was interpreted by means of Cohen's (1988) categories: 0.2-0.5 (small effect); 0.5-0.8 (medium effect); >0.8 (large effect).

4.4 Results

4.4.1 Sample Characteristics and Baseline Assessment

For children ages 2-6 years, no significant demographic or medical characteristic differences between the two treatment groups were observed (Table 26). In school-age children, the intervention group included more families of higher SES (Table 26); consequently, SES was included as an additional covariate in the analysis of school-age children. Symptom levels at baseline differed significantly only in school-age children, with the intervention group exhibiting more depressive symptoms than controls (t=-2.089; p<.05).

Table 27.
Comparison of Primary and Secondary Outcome Variables between Intervention and Control Conditions in 2-6 year old children (N=51)

	Intervention Group			Control Group			ANCOVA						
							Time x Group		Time		Post hoc Test		
	N	EMM	(SE)	N	EMM	(SE)	F[a]	p	F[a]	p	t	p	SMD
PTSD													
Total No. of Symptoms													
3 months	25	3.36	0.52	21	3.09	0.47					-0.39	0.70	0.11
6 months	25	2.46	0.47	21	2.09	0.43	0.02	0.88	2.49	0.12	-0.58	0.56	0.17
No. of Intrusion Symptoms													
3 months	25	1.77	0.29	21	1.60	0.26					-0.43	0.67	0.12
6 months	25	1.02	0.21	21	1.10	0.19	0.32	0.58	4.68	0.04	0.26	0.80	-0.07
No. of Avoidance Symptoms													
3 months	25	0.77	0.18	21	0.67	0.16					-0.40	0.69	0.11
6 months	25	0.53	0.19	21	0.35	0.17	0.17	0.68	3.53	0.07	-0.69	0.49	0.20
No. of Arousal Symptoms													
3 months	25	0.89	0.22	21	0.77	0.20					-0.39	0.70	0.11
6 months	25	0.94	0.21	21	0.61	0.19	0.47	0.50	0.09	0.76	-1.16	0.25	0.33
Behavior Problems													
Total Score (T-value)													
3 months	20	42.11	2.34	12	39.53	1.81					-0.87	0.39	0.30
6 months	20	41.87	2.44	12	37.68	1.89	0.43	0.52	1.53	0.23	-1.35	0.19	0.47
Internalizing Score (T-value)													
3 months	20	42.10	2.22	13	41.09	1.79					-0.36	0.72	0.12
6 months	20	42.51	2.49	13	37.92	2.01	1.23	0.28	0.18	0.68	-1.44	0.16	0.48
Externalizing Score (T-value)													
3 months	20	44.17	2.30	13	41.44	1.85					-0.92	0.36	0.31
6 months	20	43.42	2.22	13	39.58	1.79	0.20	0.66	1.02	0.32	-1.35	0.19	0.45

Note: EMM = Estimated Marginal Mean; SE = Standard Error; SMD = Standard Mean Difference.
[a] *df = 1*

Comparing drop-outs and those completing the study revealed no significant differences in demographic or medical characteristic variables, or in baseline symptoms, even when pre-school and school-age children were analyzed separately (data not shown). Therefore, despite the relatively high attrition rate (14.8%), no selection bias was evident.

4.4.2 Efficacy of the EPICAP Intervention

Tables 27 and 28 compare primary and secondary outcomes between the two treatment groups in pre-school-age and school-age children, respectively. In pre-school children, a significant decrease over time was identified in the number of intrusion symptoms. However, no significant time-by-group interactions or *post hoc t*-tests were identified with regards to the number of PTSD symptoms or behavioral problems (Table 27).

Among school-age children, a significant decrease over time was discovered for depressive symptoms (Table 28); however, there again was no significant time-by-group interaction. The time-by-group interaction was almost significant for the number of intrusion symptoms (p = .06) with a small negative effect size at T1 (SMD=-0.49). With regards to internalizing problems, a significant group difference with a large effect size was found at T1 (SMD=-1.11), whereas the difference at T2 was still of medium magnitude, but non-significant (SMD=-0.53). In sum, intervention effects were more pronounced at T1 than at T2.

Table 28.
Comparison of Primary and Secondary Outcome Variables between Intervention and Control Conditions in 7-16 year old children (N=57)

	Intervention Group			Control Group			ANCOVA						
							Time x Group		Time		Post hoc Test		
	N	EMM	(SE)	N	EMM	(SE)	F[a]	p	F[a]	p	t	p	SMD
PTSD													
Total No. of Symptoms													
3 months	20	2.20	0.68	24	3.21	0.75					0.96	0.34	-0.29
6 months	20	1.58	0.58	24	1.45	0.65	1.72	0.20	3.08	0.09	-0.14	0.89	0.04
No. of Intrusion Symptoms													
3 months	20	0.74	0.33	24	1.56	0.36					1.60	0.12	-0.49
6 months	20	0.64	0.28	24	0.54	0.30	3.79	0.06	2.33	0.14	-0.24	0.82	0.07
No. of Avoidance Symptoms													
3 months	21	0.70	0.29	24	0.87	0.31					0.39	0.70	-0.12
6 months	21	0.44	0.23	24	0.49	0.25	0.14	0.71	0.32	0.58	0.13	0.89	-0.04
No. of Arousal Symptoms													
3 months	20	0.67	0.26	24	0.85	0.28					0.45	0.66	-0.14
6 months	20	0.47	0.20	24	0.43	0.22	0.30	0.59	1.54	0.22	-0.13	0.90	0.04
Behavior Problems													
Total Score (T-value)													
3 months	19	48.40	1.41	23	51.36	1.57					1.36	0.18	-0.42
6 months	19	49.73	1.40	23	49.01	1.55	2.11	0.15	0.43	0.52	-0.33	0.74	0.10
Internalizing Score (T-value)													
3 months	20	45.73	1.43	20	53.17	1.43					3.44	0.00	-1.11
6 months	20	45.37	1.73	20	49.68	1.73	1.51	0.23	1.52	0.23	1.65	0.11	-0.53
Externalizing Score (T-value)													
3 months	20	49.31	1.42	23	49.99	1.53					0.31	0.76	-0.10
6 months	20	50.80	1.97	23	50.48	2.12	0.13	0.72	0.27	0.60	-0.11	0.92	0.03
Depression Symptoms													
Total T-value													
3 months	20	44.28	1.87	24	45.02	2.07					0.25	0.81	-0.08
6 months	20	43.15	1.67	24	41.32	1.85	1.36	0.25	4.85	0.03	-0.69	0.49	0.21

Note: EMM = Estimated Marginal Mean; SE = Standard Error; SMD = Standard Mean Difference.
[a] *df = 1*

No intervention effects were evident with regards to the diagnosis of ASD/PTSD (Table 29). Across conditions, among pre-school children, the number of diagnoses decreased over time from 21.6% at T0 to 7.1% at T2. In school-age children, the prevalence remained almost stable over time with only two (3.5%), three (5.9%), and two children (4.4%) meeting criteria for ASD at T0 and PTSD at T1 and T2, respectively.

4.4.3 Subjective Evaluation of the Intervention

In our study, the vast majority of mothers studied the psycho-education leaflet (78.6%), whereas only a few children ages 7-16 years looked at the brochure (36.4%). Most mothers indicated that they found both the intervention (68.8%) and the information leaflet (69.2%) for their 2-6 years old child *helpful* or *very helpful*. Conversely, only a few mothers of children ages 7-16 years indicated that they found the intervention (38.5%) or the information leaflet (8.3%) *helpful* or *very helpful*. Only 3.6% of the mothers and 9.1% of the school-age children found the intervention *strongly* or *very strongly distressing*.

Table 29.
Comparison of PTSD Diagnoses by age-group and intervention condition

	2 to 6 years								7 to 16 years							
	Intervention Group			Control Group			Statistics		Intervention Group			Control Group			Statistics	
	N	n with PTSD	%	N	n with PTSD	%	χ^2	p	N	n with PTSD	%	N	n with PTSD	%	χ^2	p
PTSD at Baseline	25	6	24.0	26	5	19.2	0.171	0.68	29	1	3.4	28	1	3.6	-[a]	1.00
PTSD at 3 months	24	2	8.3	25	3	12.0	-[a]	1.00	26	2	7.7	25	1	4.0	-[a]	1.00
PTSD at 6 months	20	3	15.0	22	0	0.0	-[a]	0.10	24	1	4.2	21	1	4.8	-[a]	1.00

[a] Fisher's exact test was used

4.5 Discussion

The current RCT is the first to assess the efficacy of an age-adjusted early psychological intervention in injured children from pre-school through age 16. Contrary to our hypothesis, the intervention failed to produce any effect on PTSD symptoms, the rate of PTSD diagnoses, or behavioral problems in pre-schoolers. Among 7-16 year-old children, however, our findings tentatively support a beneficial intervention effect: children receiving the intervention had borderline fewer intrusive PTSD symptoms (p=.06) and significantly fewer internalizing problems with a small (*SMD*=-0.49) and large (*SMD*=-1.11) effect size, respectively, at 3-months follow-up. Thereby, effect sizes were comparable to those reported for previous RCTs (Kramer & Landolt, 2011). Given that differences at 3 months were more pronounced than at 6 months, the intervention might have helped the children to recover more

quickly. Interestingly, no beneficial effects were noted for externalizing problems, potentially due to the intervention's focus on trauma reconstruction, which might have helped the child to create a better-integrated trauma memory (Neuner et al., 2008). Possibly, externalizing problems might be better addressed by training children in specific coping strategies or via educational counseling for parents. Although session 2 addressed the former, it seems that children might not have been able to transfer this knowledge into daily life. Consequently, either *in-vivo* exposure and/or further sessions to deepen and monitor competency in coping strategies might have been necessary. Consistent with previous findings (Kramer & Landolt, 2011), the intervention was ineffective at reducing PTSD diagnosis rates.

Though included among internalizing problems, depressive symptoms were not affected by the intervention. Similarly, Zehnder et al. (2010) failed to identify any interventional effects on depressive symptoms in 12-16 year-old children, but did so in those 7-11 years old. Unfortunately, our small sample size did not allow for subgroup analysis by age. However, it should be noted that the findings of previous RCTs are mostly heterogeneous (Kramer & Landolt, 2011). Only one study revealed beneficial effects across all outcome variables (Berkowitz et al., 2011). Others identified no intervention effects at all (Kassam-Adams et al., 2011; Kramer & Landolt, 2011) or reported inconsistent findings across different outcome variables (Kramer & Landolt, 2011). One interpretation of these inconsistencies is that the types of intervention differed between studies. Furthermore, most RCTs involved small subject samples, and the interventions and analyses were not age-specific. Further research should include larger samples stratified by age.

The results of the subjective ratings show that mothers of young children found the intervention helpful and not distressing, whereas both school-age children and their parents did neither find the intervention helpful, nor distressing. Hence, subjective importance might have been given for pre-school children's mothers but not for school-age children and their parents.

4.5.1 Limitations

This study has several limitations. First, the participation rate was low (57.4%), limiting the results' generalizability; however, response rates in previous RCTs on early psychological interventions were similarly low (e.g. Kassam-Adams et al., 2011; Zehnder et al., 2010). The present findings also must be extrapolated with caution to foreign immigrants as well as to individuals who tend to have shorter hospital stays and be less severely injured, because these characteristics differed significantly between our participants and non-participants. Second, sample sizes were small and the degree of morbidity we observed was low. Consequently, statistical analyses lacked power and significant intervention effects were harder to identify. Results should therefore be considered tentative. Third, children in the control condition were

interviewed at baseline, and questions asked regarding PTSD symptoms might have sensitized such families to potential trauma-related conduct issues in their children. Hence, parents either could have more carefully observed their child's behavior and/or be more empathetic, which could, in itself, serve as an intervention (Berkowitz et al., 2011); or they could have felt reassured seeing that their child exhibited only a few of the potential symptoms.

Despite these limitations, the present study has several strengths, including its randomized-controlled prospective design with two blinded follow-up assessments, where highly standardized instruments were used. Moreover, the study followed a step-wise protocol, providing manualized 2-session intervention only to children screened at risk for long-term psychological maladjustment.

4.5.2 Implications for Clinicians and Researchers

The EPICAP intervention was ineffective in pre-school children. Considering that there have been no other studies on early interventions in this age-group, "watchful waiting" may currently be the best practice for children under 6 years old, meaning that professionals monitor regularly for current needs (Kassam-Adams et al., 2011). Given that an early screening instrument for pre-school children is now available (Kramer et al., 2013), monitoring could be constrained to children at risk. Since parents of pre-school children perceived the intervention as helpful, clinicians still might provide psycho-education and training in coping skills for a child's or parent's acute stress symptoms, despite today's lack of evidence. Such educational guidelines could be especially helpful to parents during the highly distressing acute phase after their child's accident, empowering them with goal-oriented activities they themselves can undertake to enhance their child's and their own health.

Although no significant intervention effects were discovered, some lessons can be learned from this study with regards to future early intervention studies with pre-school children. First, because the time spent on the trauma narrative was restricted, trauma narration primarily focused on the traumatic event, while subsequent medical procedures were addressed only marginally. Since medical procedures significantly impact a child's PTSD symptoms (Graf et al., 2011), early intervention should also address these stressors. Second, one could argue that, among young children, brief trauma reconstructions might be too abstract, such that these children might benefit more from *in-vivo* exposures. For example, parents should be encouraged and instructed to carefully confront their child with trauma-related stressors, like the place where the accident happened. Third, research on risk factors for PTSD symptoms have demonstrated the importance of parental factors (De Young et al., 2011b). Although we included parents in the intervention and provided coping skills on child PTSD symptoms, relational aspects might have been missed. Scheeringa and Zeanah (2001) suggested that parental re-enactment, withdrawal/unavaila-bility, and overprotection all

negatively influence a young child's recovery from PTSD. Hence, any adaptation of the EPICAP intervention for pre-school children should integrate parenting strategies and parental distress.

There is tentative evidence that that school-age children who received the 2-session EPICAP intervention recovered more quickly from intrusive PTSD symptoms and from internalizing problems. Consistent with previously published findings (Kramer & Landolt, 2011), we therefore suggest to follow a step-wise protocol, providing early interventions only to children at risk. Interventions should involve at least one parent, provide psycho-education, and teach individual coping skills. Whether including a trauma narrative contributes to better recovery remains unclear; however, since no deleterious effects were found, providing some sort of trauma exposure among children at risk might be appropriate.

4.6 Acknowledgements

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5 GENERAL DISCUSSION

5.1 Summary of the Findings

The primary aim of this thesis was to further develop and evaluate an age-adjusted, standardized, early psychological intervention for children ages 2-16 years, after accidental injuries. Following the methodologically high standard of current intervention research, the intervention was tested by means of a randomized, controlled trial (RCT).

As a first step, literature was systematically searched for previous early psychological intervention studies on children and adolescents after a single traumatic event. Meta-analysis was performed on all available, relevant data (Chapter 2). The first aim of the meta-analysis was to estimate effect sizes for several outcome variables across the studies. Seven studies were included. Results revealed the majority of Standardized Mean Differences (SMD) falling in the negative range between -.10 and -.60, with negative SMDs indicating that the intervention was superior to the control condition. Dissociation (SMD=-1.25 at T1; SMD=-1.26 at T2) and anxiety (SMD=-.58 at T1; SMD=-.40 at T2) were the outcomes that experienced the largest and most significant intervention effects. The remaining outcome variables exhibited generally beneficial but small overall effects at both time points. With regards to the magnitude of effects, it could be concluded that established trauma therapy (e.g., tf-CBT) was clearly more effective than early interventions. Nevertheless, considering the brevity of the early interventions, the mean effect size estimates that were identified via meta-analysis are remarkable. One may therefore conclude that early interventions are helpful in children after a single traumatic event.

The second aim of the meta-analysis was to determine the elements of early psychological interventions that are helpful in children after a single traumatic event, in order to advise clinical psychologists how to intervene. It could be suggested that age-appropriate psycho-education should be included, as well as training in individual coping-skills, parental involvement and, possibly, some form of trauma exposure via the creation of a trauma narrative. Providing additional sessions might also be a determinant of an intervention's efficacy. A step-wise, risk-based practice protocol should be considered, because most children recover without professional help. With this in mind, a child's risk of long-term psychological maladjustment should be assessed early, so early interventions can be offered to those at risk.

Drawing both from the findings of the above-mentioned meta-analysis and from the results of a previous study performed within our own department on early psychological intervention in children after road traffic accidents (Zehnder et al., 2010), a secondary preventative

intervention for children was created (Chapter 1.6). This *Early Psychological Intervention for Children and Parents* (EPICAP) was manualized separately for three age-groups of children: 2-6, 7-11, and 12-16 years. The EPICAP intervention is a 2-session intervention that incorporates psycho-education, a trauma narrative with age-specific intervention material for 2-11 and 12-16 year old children, and training on individual coping strategies. For children of all ages, the trauma narrative was performed with at least one parent present. Pre-school children were supported by their parents as needed. Psycho-education on age-specific PTSD symptomatology was provided for parents of young children. For older children, psycho-education was offered to both the parents and child. Coping strategies were taught to parents of young children and to children ages 7-16 years. In summary, the EPICAP intervention implemented all interventional elements and adopted the step-wise protocol suggested by the findings of the meta-analysis.

Because the RCT followed a step-wise, risk-based protocol, screening instruments to estimate a child's risk of long-term psychological maladjustment were required. While for school-age children a handful of successfully-evaluated early risk screeners were available, for pre-school children no such instrument had been evaluated in the early aftermath of a single traumatic event. Therefore, as a second step, the screening instrument to be administered to pre-school children was evaluated (Chapter 3).

The screening-instrument consisted of an adapted version of the Pediatric Emotional Distress Scale (PEDS; Saylor et al., 1999), the PEDS-ES (PEDS–Early Screener), as well as questions on five additional risk factors. It was hypothesized that (1) both the PEDS-ES and the additional risk factors would contribute to the early screening instrument's good predictive performance; and that (2) the screening instrument would be highly sensitive and moderately specific. Full or partial PTSD was used as a criterion measured six months after the accident by means of the PTSD Semi-structured Interview and Observational Record for Infants and Young Children (PTSDSSI). Hypothesis (1) was not confirmed: the PEDS-ES performed best when used alone. By contrast, hypothesis (2) was confirmed; the PEDS-ES exhibited good sensitivity (85%) and moderate specificity (63%). This result is quite comparable to results of early screening instruments in school-age children (Table 5). In consequence, it was suggested that the PEDS-ES should be used alone in pre-school children early after a single traumatic event within a stepped-care model.

As a third step, by means of an RCT, the EPICAP intervention was tested empirically on 51 individuals ages 2-6 years and 57 individuals ages 7-16 years, all following either a road traffic accident or burn (Chapter 4). Data were analyzed for these two age-groups separately. Children were randomly allocated to either the intervention or control condition. Children in the control condition received standard medical care, whereas children in the intervention group additionally received the age-adjusted EPICAP intervention. Follow-up assessments

were carried out three and six months after the child was involved in the accident. A child's PTSD symptoms and diagnoses were the primary outcomes. Secondary outcomes were the child's behavior problems (children ages 2-16 years) and symptoms of depression (children ages 7-16 years).

In pre-school children, no significant differences between the two treatment arms were identified for any outcome variable. Hence, the RCT failed to confirm the hypothesis that pre-school children who received the early psychological intervention would suffer fewer PTSD symptoms and demonstrate fewer behavioral problems than children not offered the early intervention. However, it should also be noted that the EPICAP intervention did not have any deleterious effect on young children. Among school-age children, the hypothesis was confirmed, to some extent, in that there was tentative evidence that older children who received the EPICAP intervention suffered from fewer intrusive PTSD symptoms and internalizing problems than children not offered the intervention. Since no significant differences between conditions were detected for the remaining outcomes, it can be concluded that the intervention again did not do any harm.

In this concluding chapter, the main findings of this research project will be discussed (Section 5.2). In Section 5.3, methodological strengths and limitations of the present RCT will be reflected upon. Implications for future research and clinical implications will be presented in Sections 5.4 and 5.5, respectively. Finally, general conclusions will be provided in Section 5.6.

5.2 General Reflections on the Findings

5.2.1 Findings of the present RCT in the Field of Early Intervention Studies

Since the publication of our meta-analysis, one RCT on early psychological interventions in children has been added (Kassam-Adams et al., 2011). As presented in Section 1.3.4.1, this study did not find any intervention effects in children ages 8-17 years old after an unintentional injury. The RCT on the EPICAP intervention presented in this thesis is therefore the eighth published randomized trial (notably, three of the studies included in the meta-analysis were controlled but not randomized, and one RCT was excluded from our analysis because of unsatisfactory methodological quality (Table 30)).

With regards to age, the present RCT is the first that included children younger than 7 years. While for young children studies are desperately needed, there are already several publications on older children. This allows for some conclusions on older children to be drawn. Based upon the results of our meta-analysis, we conclude that early psychological interventions are helpful for children (Chapter 2).

Table 30.
Summary of available controlled early psychological intervention studies in children after a single traumatic event

Study	RCT	Type of Intervention	Reported result	Included in the meta-analysis
Berkowitz et al., 2011	Yes	Caregiver-Child Intervention (CFTSI)	+	Yes
Chapman et al., 2001	Yes	CATTI[a]	=	No
Cox et al., 2010	Yes	Web-based information provision	+	Yes
Kassam-Adams et al., 2011	Yes	Psycho-education and discussion of (1) current distress, (2) factors that hinder child's support system, and (3) child's/parent's question about medical treatment	=	No
Kenardy et al., 2008	No	Information booklet provided	+	Yes
Kramer & Landolt, submitted	Yes	Cognitive-behavioral (trauma narrative, psycho-education, and coping strategies)	= / +[b]	No
Poijula et al., 2001	No	Defusing and psychological debriefing	=	Yes
Schreier et al., 2005	Yes	CATTI[a]	=	No[d]
Stallard et al., 2006	Yes	Debriefing	=	Yes
Yule et al., 1992	No	Group Debriefing	+	Yes
Zehnder et al., 2010	Yes	Cognitive-behavioral (trauma narrative, psycho-education, and coping strategies)	+ / =[c]	Yes

Note: + positive study results reported with the intervention group being superior to the control group; = No significant intervention effects reported
[a] Chapman Art Therapy Treatment Intervention (CATTI)
[b] pre-school children / school-age children
[c] 7-11 year old children / 12-16 year old children
[d] excluded because of unsatisfactory methodological quality

These findings, though encouraging, must be discussed critically. First, considering all published RCTs as well as the non-randomized but controlled trials included in the meta-analysis, the interventions studied are very heterogeneous. Three interventions followed the psychological debriefing format (Poijula et al., 2001; Stallard et al., 2006; Yule, 1992); two interventions were based upon the Chapman Art Therapy Intervention (Chapman et al., 2001; Schreier et al., 2005); two interventions provided psycho-education only (Cox et al., 2010; Kenardy et al., 2008); two interventions were cognitive-behavioral therapy oriented (Kramer & Landolt, submitted; Zehnder et al., 2010); one intervention focused mainly on caregiver-child interactions (Berkowitz et al., 2011); and one intervention included psycho-education, coping-skills training, and information about the medical treatment (Kassam-Adams et al., 2011) (Table 30). Aside from the tremendous variety in these early interventions, the reported results are heterogeneous as well. This makes it difficult to conclude which interventions are most helpful. For instance, out of the three debriefing studies, two failed to identify any intervention effects, whereas one did so. However, the study with positive effects (Yule, 1992) provided therapy to groups, rather than to individuals. By contrast, a handful of studies detected beneficial effects with individualized therapy. Information provision seems to be helpful because the two studies that solely provided psycho-education detected positive intervention effects (Cox et al., 2010; Kenardy et al., 2008). Nevertheless, it remains unclear why some of the studies that provided psycho-education in addition to other intervention elements either failed to reveal any intervention effects (Kassam-Adams et al., 2011; Poijula

et al., 2001; Stallard et al., 2006) or identified intervention effects only in a sub-sample (Kramer & Landolt, submitted; Zehnder et al., 2010).

Our RCT on the EPICAP intervention fits well into this landscape of equivocal results. A large and statistically-significant effect was found with regards to internalizing problems; and a nearly significant, medium intervention effect was identified for intrusive PTSD symptoms. However, both findings were in school-age but not pre-school children. Hence, the intervention appeared ineffective for young children. One could argue that the intervention is effective for older children, which is true despite only two of several outcomes of interest changing. But in practice, it is questionable whether even a large and significant effect that is restricted to only one or two of numerous important outcome variables justifies the use of an elaborate 2-session intervention. In other words, children receiving the EPICAP intervention do not appear to recover more quickly from PTSD avoidance or hyper-arousal symptoms, or from depressive symptoms or externalizing problems, relative to children not offered the intervention. Moreover, receiving or not receiving the intervention does not appear to significantly influence any outcome six months post-trauma. It therefore seems justified to ask whether early interventions should be forgone in favor of "watchful waiting". With the latter, potentially more cost-effective approach, children would be professionally monitored over the first few weeks and provided with trauma therapy only if clinically significant posttraumatic stress symptoms persist beyond this time. Notably, there is good evidence supporting a variety of trauma-focused psychotherapy methods in children (e.g. tf-CBT or EMDR; Landolt, 2012).

From the perspective of today's scientific evidence, *watchful waiting* is a reasonable approach. From a clinician's perspective, however, there is a valid objection to be considered. Experiencing some form of trauma is a dramatic occurrence in a child's and their parents' lives, and affected individuals often are highly distressed in the immediate aftermath of such an event (Section 1.2). Knowing that these acute symptoms mostly diminish over time without any professional help might ethically justify omitting any early intervention. This is even true for children screened at high risk for long-term psychological maladjustment. There is evidence that even individuals who are at high risk for maladjustment recover only marginally better after early intervention than high-risk individuals offered no early intervention (Kassam-Adams et al., 2011; Kramer & Landolt, submitted). However, children and parents who do not know that the prevailing stress symptoms are likely to diminish spontaneously within a few days to weeks, are likely to be worried. Whether or not being worried impacts psychological recovery does not change the fact that being worried is an additional burden to families who are already distressed after a traumatic experience. Therefore, it would seem more ethical to provide children and parents with psycho-education

on acute and posttraumatic stress symptoms, despite the fact that research, though mostly supportive, is not yet definitive on this issue.

Risk screening could also be helpful. For instance, being found to be at low risk of severe distress would likely reassure parents and children. Present stress symptoms might be judged less threatening. Conversely, being screened at high risk might increase a family's worry over a child's prevailing stress symptoms. This would consequently require that the child and family at least be monitored by professionals, if not provided some type of early intervention. For these families, provision of psycho-education on posttraumatic stress symptoms might be useful, because it could help them to better understand the nature and potential course of present stress symptoms.

Adopting the view of affected families, being provided with information on the nature of acute and posttraumatic stress might not satisfy your wish to *do* something to relieve your child's or your own stress symptoms. This is further justification to at least consider early intervention, despite conflicting evidence. That early interventions do not seem to harm children supports this practice. This is an important finding, as it has been shown that intervening early might be harmful in adults (Rose et al., 2009). These considerations put the results of our meta-analysis into another light. The effectiveness of an early intervention is therefore no longer the only consideration. Even if parents and children do recover spontaneously, they may need to be supported during the acute phase to prevent them from being additionally distressed about their prevailing posttraumatic stress symptoms. It is therefore reasonable to provide intervention elements that offer the potential to diminish stress reactions of any kind (e.g., posttraumatic stress symptoms, depressive symptoms, or behavioral problems). In our meta-analysis, training in individual coping-skills and trauma re-telling could be suggested as activity-oriented intervention elements.

To provide families with risk screening and subsequent individualized information on potential stress symptoms and educational guidelines, online and even interactive information could be both cost-effective and easily accessible (e.g., an interactive web-site or application for portable electronic devices). Based upon this risk estimate, the family could be provided with individualized information, like psycho-education on the child's present stress symptoms, as well as symptom-specific coping strategies. In addition, contact information for further help (i.e., trauma therapists) near where the family lives could be listed.

5.2.2 Reliability of Findings

Our conclusions are based on the assumption that the findings of the studies on early interventions in children are accurate. But are these findings reliable, and what are potential sources of error and bias?

In our RCT on the EPICAP intervention, we found an unexpectedly low rate of morbidity. In school-age children, the prevalence of full blown ASD was 3.5% at baseline and 4.7% at 6-months follow-up. In pre-school children, the rate of PTSD was higher, being 21.6% at baseline and 7.7% six months post-accident. Note that these prevalence rates were in children considered high risk upon screening. If the complete sample is considered, including children found to be at low risk, the prevalence was even lower: 3.0% of the pre-schoolers and 2.0% of the school-age children met the criteria for PTSD at 6-months follow-up (Table 31).

Table 31.
PTSD Prevalence at 6-months follow-up

	2 to 6 years old			7 to 16 years old			2 to 16 years old		
	N	N with PTSD	%	N	N with PTSD	%	N	N with PTSD	%
High risk group	39	3	7.7	43	2	4.7	82	5	6.1
Low risk group	60	0	0.0	57	0	0.0	117	0	0.0
High and low risk group	99	3	3.0	100	2	2.0	199	5	2.5

In 2005, Landolt et al. (2005) reported that 16.2% and 17.6% of 6-14 year old children exceeded the clinical cutoff (>24) for PTSD in the *Child PTSD Reaction Index* (Frederick, Pynoos, & Nader, 1992) 4-6 weeks and 12 months after a road traffic accident, respectively. In a recent Swiss study (Landolt et al., 2013), PTSD prevalence in adolescents was roughly 10% after a severe accident (Section 1.2.2.1). In systematic reviews in which non-Swiss samples were included, the prevalence was found to be higher, approximately 20% after unintentional injuries (Kahana et al., 2006) and 27% after road traffic accidents (Olofsson et al., 2009). These data suggest that morbidity rates are lower in Switzerland than in other European countries or the United States; and that morbidity rates after unintentional injuries have decreased slightly over the last decade. This becomes even clearer if statistics at the same Swiss hospital are observed over time. For instance, in 2010 Zehnder et al. (2010) reported a PTSD prevalence of 4% in untreated 7-16 year old children six months after a road traffic accident. In contrast, in 2013, Kramer and Landolt (submitted) found the above-mentioned prevalence of 2.0% in children within the same age range after road traffic accidents or burns.

One possible explanation, especially for the decreased rate of morbidity in our sample of school-age children treated at Children's Hospital Zurich after unintentional injuries, might be the effects of trauma informed care over the past decade. For instance, several studies have been conducted on PTSD after road traffic accidents and burns at Children's Hospital Zurich (e.g. Graf et al., 2011; Kramer & Landolt, submitted; Landolt et al., 2009a; Landolt, Marti, Widmer, & Meuli, 2002a; Landolt et al., 2003; Landolt et al., 2005; Landolt, Vollrath, Gnehm, & Sennhauser, 2009b; Landolt, Ystrom, Sennhauser, Gnehm, & Vollrath, 2012; Schiestl, Beynon, & Balmer, 2006; Zehnder et al., 2010), and this research might have influenced PTSD prevalence in accidentally-injured patients. First, all of these studies were

done in co-authorship with physicians and data collection/interventions were at least partially conducted on inpatients within the hospital's Department of Surgery. This might have sensitized both physicians and nurses for ASD and PTSD symptoms in surgery patients. Second, the findings of these studies led to adaptations in treatment procedures. For instance, knowledge about the connection between pain and PTSD (Landolt et al., 2002a) and medical procedures and PTSD (Graf et al., 2011) impacted both psychological and medical pain management procedures (Schiestl et al., 2006). Likewise, after the study of Zehnder et al. (2010) was completed, conducting early psychological interventions with children at risk became the standard procedure for psychologists at University Children's Hospital Zurich. A third reason that is not directly related to research activities at University Children's Hospital is that psychologists are part of the treatment team in several departments (e.g., surgery and oncology). Therefore, psychologists are present in the department on a daily basis. This sensitizes physicians and nurses even more to potential psychological problems in paediatric patients. A fourth reason could be that the psychological sequelae of traumatization are being increasingly discussed in public.

As a consequence of the possible beneficial impact of past research activity at University Children's Hospital Zurich, future research projects on early interventions should also focus on the hospital's medical staff (e.g., nurses and physicians). For example, risk screening could be conducted by nurses instead of by psychologists or psychiatrists, with psychotherapists consulted only if a patient screens at high risk.

The problem of low morbidity in the present sample was accentuated by the small sample size, the high rate of spontaneous remission, and the screening instrument's low specificity. These issues shall now be discussed.

To estimate required sample sizes, *a priori* power calculations for ANOVAs with repeated measures were generated using the program G*Power3 (Faul, Erdfelder, Lang, & Buchner, 2007). For an effect size of d=.60 (f=.30; based on the effects found in school-age children in the study of Zehnder et al., 2010), an α-level of .05, and power of $1-\beta=.90$[5], a sample size of $N=32$ ($n=16$ within each treatment arm) was needed. In pre-school children, our initial sample was 51 children, with 46 remaining at 6-months follow-up. Meanwhile, in school-age children, we started and ended with 57 and 46 children, respectively. Hence, it can be concluded that, with regards to power, our samples were large enough for inferential statistics, even when the two age-groups were analyzed separately. In school-age children, where medium to large effect sizes were found, statistically-significant differences were identified. However, many outcome variables exhibited only small effect sizes, which would have required even larger samples to detect. Moreover, for this age-group, the size of the sample

[5] number of groups=2, number of measurements=2, correlation among repeated measures=.5, non-sphericity correction $\varepsilon=1$

did not allow us to conduct separate analyses for the 7-11 and 12-16 year-old sub-groups of children, as performed by Zehnder et al. (2010). It therefore would have been more appropriate to base our *a priori* sample size estimates on smaller effect sizes. This became even more evident in pre-school children, in whom all effect sizes were small. If, for example, an effect size of approximately d=.40 (f=.20) was assumed, the required sample size would have been 68 (n=34 in each treatment arm) to achieve 1-β=.90 power. In summary, our sample sizes were too small to statistically confirm smaller effect sizes in both age-groups. This could have led to type II error, the erroneous failure to reject null-hypotheses (μ=0).

Further issues were the high rate of spontaneous remission and the screening instruments' low specificity. As shown earlier (Section 1.2.2), the vast majority of children recover after single-event trauma without any professional help. For this reason, a risk screening procedure was used to eliminate children from treatment who would be expected to recover spontaneously. However, specificity was 63% for the PEDS-ES (Kramer et al., 2013) and 74% for the TSQ/10 (Kenardy et al., 2006). This means that 37% and 26% of pre-school and school-age children, respectively, were provided with an intervention they likely did not need. These children had presented with very few to no stress symptoms. It is difficult to identify any intervention effects in a subgroup like this, because there is too little room for clinical improvement. Since many of our children exhibited very few to no stress symptoms, this alone might have biased the results of our RCT towards type II errors.

Children who were randomly allocated to the control condition also were assessed at baseline. This could have sensitized parents to potential symptomatology in their children and strengthened the parent's empathetic reactions towards their child. As a result, the child's symptoms could have diminished (Berkowitz et al., 2011) or parents could feel reassured that their child only was suffering from a few potential symptoms. The effect of the baseline assessment could have had the same effect in the control group as screening had across the whole sample. Both procedures provided feedback on a child's actual stress symptoms. Therefore, families of children who were screened at high risk would likely be worried. On the other hand, if such a child was then randomly allocated to the intervention group, his or her family might feel relieved.

Even when a child screened at high risk and was allocated to the control group, the baseline assessment could have helped the child and/or parents to better understand predominant symptoms. This, in turn, could have led to the child or parents being more attentive to and proactive against these problems. For example, understanding avoidance and what it represents, a child might choose to face fearful situations that he or she otherwise would not. Similarly, parents might be more encouraging to the child, encouraging them to face their

fears. One could therefore argue that this two-step protocol already acts as a form of intervention to relieve a child's symptoms in the early post-trauma stage.

5.2.3 Specific Reflections on Findings in Pre-school Children

Despite the details already provided on the current study, certain considerations remain relating to pre-school children that warrant further discussion. For example, analyses showed that the EPICAP intervention was ineffective in this particularly young group of children. However, as for school-age children, the early intervention might still be of value if it does not do any harm, which seemed to be the case.

Because this is the first RCT on an early intervention in pre-school children, it was of great importance to determine the feasibility of the intervention. For school-age children, several studies have demonstrated that different types of intervention are feasible (e.g., psycho-education, training in individual coping-skills, or conducting a trauma-narrative). However, for pre-school children, little is known about which intervention elements are practicable. For example, in a recent study (Scheeringa et al., 2011a), trauma narration was feasible in young children within the framework of trauma therapy, but required up to eight sessions to be completed. One might argue that if eight sessions are needed for a trauma narration to be effective in young children, this is not practical within an early intervention. However, it must be taken into account that early intervention pursues other goals beyond trauma therapy. This is especially true of the trauma narrative. While trauma therapy aims to restructure an already-consolidated trauma memory (Chapter 1.6.2.4), early intervention aims to create a coherent trauma memory in the first place. To do so, less time might be required for the trauma narrative.

In our study, it was practical to conduct a trauma narrative with young children and their parents. During reconstruction, the child was always asked to tell the story by itself first, supported by toys and, if needed, the parents. Most children needed help at the beginning to arrange the scene with the toys. Many children also needed to be provided with detailed information. Most children were aware of the most prominent moments, but were unable to remember the exact sequence of the story. It also was remarkable that many children exhibited avoidance behaviors during the story's most distressing moments. For example, children diverted their play to some side scene when the narration came to the point in time when the child was burned by hot water. This required either the parents or the therapist to carefully return the child's focus back to the narration, a process that mostly worked well. In rare circumstances, the parents themselves exhibited strong avoidance behaviors. Then the therapist was unable to instruct the parents in how to lead their child back to the narration, and had to guide the child through the narration himself.

The first intervention session (session #1) – which included psycho-education – generally lasted about 30 minutes (*M*=30.20, *SD*=7.70, range=20-45 minutes). Children typically were able to concentrate over this time span. However, because the trauma narrative followed the baseline interview directly, the time spent on the trauma narrative was restricted, such that it focused mainly on the traumatic event itself. The child's and parents' experiences relating to subsequent medical procedures were therefore addressed only marginally. Since medical procedures are known to have a considerable impact on a child's PTSD symptoms (Graf et al., 2011), early intervention should also address these stressors (i.e., if a trauma narrative is performed, medical issues should be included). To achieve this, more time is needed, beyond the concentration span of the typical 2-4 year old child. Hence, the trauma narrative should be conducted in two steps, which will necessarily prolong the intervention. By definition, any early psychological intervention should be completed within four weeks (Section 1.3.1.2), which could be difficult to accomplish if the trauma narrative is split into two sessions and further intervention elements are included (e.g., psycho-education or individual coping-skills training).

In addition to, or as an alternative solution to a trauma narrative, pre-school children might profit from *in-vivo* exposure. For example, parents could be encouraged and instructed to confront their child with trauma-related stressors, like returning to the site where the accident happened (simultaneously, parents would be exposed to potentially distressing stimuli as well). Although during the EPICAP intervention, trauma reconstruction was arranged to be as age-appropriate as possible, with toys to illustrate and play through the complete trauma history, *in-vivo* exposure might be more concrete at this young age. This, however, would demand more guidance from the parents, who should be carefully instructed in how to best confront the child with trauma-related stressors.

In our study, at least one parent always had to be present during the early intervention. Parents were involved in the trauma narrative and were taught coping-skills for their child's PTSD symptoms (e.g., fear-facing strategies). This is consistent with research on risk factors for PTSD symptoms, which have demonstrated the importance of parental factors (De Young et al., 2011b). However, during the EPICAP intervention, relational aspects probably were neglected to some degree. Several years ago, Scheeringa and Zeanah (2001) proposed the concept of *relational PTSD*:

> *We propose the construct of Relational PTSD to describe the Compound Effect, that is, the co-occurrence of posttraumatic symptomatology in an adult caregiver and a young child when the symptomatology of one partner, usually the adult, exacerbates the symptomatology of the other. The child and parent may be traumatized by the same event or by different events, but the effects of each*

partner's symptomatology exacerbate the other's (Scheeringa & Zeanah, 2001, pp. 809-810).

The authors suggested three parenting patterns that might negatively influence a young child's recovery with respect to PTSD. First, parents suffering from PTSD might become significantly less available to their children. This behavior constitutes a *withdrawal/unavailability* pattern. Second, parents whose child was involved in a traumatic experience could be anxious that their child will be traumatized again. This may lead to a change in parenting style as parents become *overprotective*. A further reason parents become overprotective could be that they feel guilty about not having been able to protect their child from the initial trauma. Third, a *re-enacting* pattern may develop in parents who are preoccupied with trauma reminders. These parents confront their child repeatedly with details of the trauma, and this can re-traumatize the child (Scheeringa & Zeanah, 2001).

Given these maladaptive parenting patterns, the EPICAP intervention for pre-school children might be adapted to focus more on parenting strategies and parental distress. These parenting patterns should be assessed as a first step, so they can be discussed with the parents as a second step. This discussion should include concrete educational strategies for parents. Parental posttraumatic stress has been proposed as a direct cause of maladaptive parenting patterns (Scheeringa & Zeanah, 2001). Therefore, parental stress symptoms should be addressed as well. This could be done according to guidelines for early psychological interventions in adults, which suggest using individual tf-CBT sessions that include trauma narration for individuals with acute traumatic stress symptoms (Roberts et al., 2010b).

5.2.4 Pediatric Emotional Distress Scale – Early Screener

The Pediatric Emotional Distress Scale – Early Screener (PEDS-ES) was the first successfully evaluated early screening instrument for pre-school children. It exhibited good sensitivity (85%) and moderate specificity (63%). These results are comparable to results with the early risk screener for school-age children (Table 5). The PEDS-ES can therefore be recommended for use in young children after a single traumatic event. Psychologists and psychiatrists, but also physicians, teachers and parents of children who have suffered a single-event trauma might be appropriate users of this instrument.

Table 32.

Predictive performances of the STEPP, STEPP-AUS, CTSQ, and PEDS-ES

	School-age Children			Pre-school Children
	STEPP	STEPP-AUS	CTSQ	PEDS-ES
Sensitivity	0.88	0.89	0.82	0.85
Specificity	0.48	0.69	0.74	0.63
Positive Predictive Value	0.25	0.24	0.23	0.41
Negative Predictive Value	0.95	0.98	0.98	0.93

One may ask why a risk screening instrument is important if no early psychological intervention is available for a given age-group. Indeed, when the PEDS-ES was evaluated, no studies on early interventions for pre-school children had been published, the evaluation being part of the present RCT assessing the effectiveness of an early intervention in young children. Therefore, it was not clear whether children who screened as high risk could be provided with an effective early intervention. Today, we are aware that the evaluated early intervention was not effective for pre-schoolers. This raises the question of whether the PEDS-ES should be used in clinical practice. Earlier discussion (Section 5.2.1) revealed how early risk screening does several things. To begin with, within a "watchful waiting" protocol, risk screening makes sense even when no effective early intervention is available. Second, risk screening can be considered some sort of intervention in itself. Third, because using an early intervention makes sense despite the lack of proven effectiveness (as long as it does no harm), risk screening becomes even more important. Risk screening also is important in research, as selecting children at high risk designated for early intervention and screening out children at low risk helps to make subject samples more homogeneous with respect to morbidity.

For these reasons, it is of great importance for both clinicians and researchers to finally have a well-validated early screening instrument for pre-school children on hand.

5.3 Methodological Strengths and Limitations of this Intervention Study

5.3.1 Strengths

The current intervention study has several methodological strengths. For instance, it was a randomized-controlled trial, which is the best protocol by which to demonstrate any intervention's efficacy (Chambless & Hollon, 1998). Without the inclusion of at least one control condition, one could not know whether observed changes were influenced by the intervention or by other factors, like chance or confounders (Chambless & Hollon, 1998). This is why only controlled studies were included in our meta-analysis. If individuals are randomly allocated to experimental groups, the risk of confounders is lessened, because other

than the different interventions offered, the groups should differ only randomly with respect to potentially-confounding characteristics like gender and age. However, to make sure that a variety of characteristics are equally distributed between the groups, one can stratify the randomization procedure by certain characteristics. In the present RCT, randomization was stratified by age and gender because research has shown that intervention effects might be age-sensitive (Zehnder et al., 2010) and girls seem to be more prone to PTSD than boys (Section 1.2.3.4).

Because the study was prospective, with two follow-up assessments three and six months post-accident, any long-term effects of the treatment could be observed. The follow-up assessments were conducted with blinded Master's- or Doctoral-level interviewers. Interviewers who are blinded to an interviewee's experimental condition are less likely to bias outcomes. Moreover, to assess outcomes, highly standardized instruments were used; and to assess the primary outcome variable (PTSD symptoms), clinical interviews were conducted. Likewise, because the early intervention was manualized and carried out only by the current author, the intervention was relatively consistent for all participants. Following the methodological quality rating used in the meta-analysis by Kramer et al. (2011), our RCT would be rated at 87.8%, a very high quality rating that approximates the most highly-rated study we reviewed, conducted by Zehnder et al. (Zehnder et al., 2010; 90.9%). Hence, in general, the present RCT was of high quality.

5.3.2 Limitations

The largest and most problematic limitation of the current RCT was that the study was intermediate in terms of sample size, which limited its statistical power and resultant ability to statistically confirm moderate to small treatment effects (Section 5.2.2). In RCTs on early intervention studies, samples have often been intermediate in size (Kassam-Adams et al., 2011; Kramer & Landolt, 2011), ranging from N=24 to N=158 (Table 6). Since two independent samples of pre-school and school-age children had to be recruited for our RCT, the sample sizes that were relevant for inferential statistics were those of each sample individually (N=51 for pre-school children and N=57 for school-age children), rather than of the total sample of 2-16 year old children (N=108). One reason for our relatively small samples was the rather low participation rate of 57.4%. This being said, previous RCTs on early interventions in children reported comparable rates, ranging from 34% (Kassam-Adams et al., 2011) to 73% (Zehnder et al., 2010) (Table 6). Because risk screening was applied to the recruited sample, the high-risk group accounted for only 108 of the 448 eligible children, a participation rate of 24.1%, which is very low.

It also should be noted that significantly more Swiss than non-Swiss families participated in the study. Hence, cultural background might have been a reason for non-participation. For instance, parents often argued that being forced to talk about their accident might have a deleterious effect on their child, and this assumption might be more common in non-Swiss cultures. Although some non-Swiss families failed to indicate language as a problem, it seemed that some families who did not have German as a primary language refused participation because of insufficient German-language fluency. Parents were asked whether they could understand written German. Some might not have been able to do so, but failed to claim this due to cultural expectations and possible shame. Therefore, these families indicated other reasons for non-participation, like being too busy.

Table 33.
Participation rates for RCTs on early psychological interventions in children

Study	Sample size after randomization	Participation rate	Attrition rate
Berkowitz et al. (2011)	106	41.3%	5.7%
Cox et al. (2010)	85	60.7%	34.1%
Kassam-Adams et al. (2011)	85	34.3%	0.0%[a]
Kenardy et al. (2008)	104	Not specified	37.5%
Kramer and Landolt (submitted)	108	57.4%	14.8%
Stallard et al. (2006)	158	42.0%	26.5%[b]
Zehnder et al. (2010)	101	72.7%	2.0%

[a]Missing data analysis was conducted
[b]One interview was stolen

Besides this, a large proportion of non-participants could not be contacted (65; 34%); and it is not known whether these families would have met inclusion criteria or, if so, would have agreed to participate. Reasons behind these families not being available for contact include the narrow time-window for families to agree to participate (just 7-10 days post-accident); and recruitment occurring during school holidays when many families were not at home, either to receive telephone calls or mail. Most of the non-participants who were contacted indicated that they had no time (46, 36.5%) or no interest (30, 23.8%), or that the study would create additional strain on their child or themselves (19, 15.1%). Twenty-four children (19%) themselves refused to participate, and seven families (5.6%) provided no reason for non-participation. A large proportion of families who declined to participate might have felt under inordinate strain directly because of their child's accident; for example, many parents reported having numerous administrative tasks thrust upon them, like filling out insurance forms or being interviewed by the police, which were both time-consuming and emotionally stressful. The present RCT also might have been too low a priority for many families to consider. Notably, the RCT was somewhat time-intensive, requiring child and parental participation at three time points within six months. This is quite a commitment for any family directly after a traumatic event.

A further reason for the small samples was that the rates of drop out after randomization were relatively high in both age-groups. Five children (9.8%) were lost to follow-up in the pre-school sample and 11 (19.3%) in the school-age sample, for an overall attrition rate of 14.8% across the entire sample. Note, however, that previous RCTs have experienced both considerably lower and considerably higher dropout rates, ranging from 0% (Zehnder et al., 2010) and 5.7% (Berkowitz et al., 2011) to 26.5% (Stallard et al., 2006) and 37.5% (Kenardy et al., 2008) (Table 6).

5.4 Implications for future Research

Based on the preceding discussion, the following suggestions for future research can be given. Traumatic experiences cause significant distress in parents and children. Early support might therefore be of great importance to families who display early stress symptoms. This is true, irrespective of the fact that most children recover without any professional help, because recovery from early stress symptoms is only seen weeks to months after being exposed to a traumatic event and not in the acute phase. During this acute phase, affected individuals are often worried about the potential physical and psychological sequelae that the accident might have. For these families, early interventions might be of great immediate importance, independently of the intervention's long-term efficacy. (Of course, it is essential that the intervention does no harm, which appears to be the case in children). The findings of Cox et al. (2010) corroborate these considerations. They found that children who indicated distressing symptoms at baseline used the intervention they were provided (an information booklet) and found it to be helpful. This suggests that (1) children at risk seem to desire early help; and (2) they feel satisfied when help is provided. The authors assessed the outcomes at 4-6 weeks, and then again six months post-injury. The time-by-treatment interaction was significant for anxiety but not for anger, depression, posttraumatic stress, or dissociation. Hence, one could argue that future research should focus on both the individual's perception of early psychological help and the course of stress symptoms within the first days to weeks. Families receiving early support might experience less distress early after a child has been traumatized and might even recover more quickly from posttraumatic stress symptoms within the first days to weeks post-trauma. These differences might not be detectable months after the accident. Nevertheless, including a long-term follow-up assessment could still be informative.

In our study, the vast majority of mothers for whom 6-month follow-up data were available studied the psycho-education leaflet (78.6%), whereas only a few children between the ages of 7 and 16 years old looked at the brochure (36.4%). Most mothers of 2-6 year old children indicated that they found both the intervention (68.8%) and the information leaflet (69.2%)

helpful or *very helpful*. Conversely, only a few mothers of 7-16 year old children found the intervention (38.5%) or the information leaflet (8.3%) *helpful* or *very helpful*. Comparing ratings for the complete intervention and the leaflet separately, ratings for the former were higher than for the latter both in children ages 7-16 years and their mothers. This suggests that the leaflet was perceived as less helpful than the trauma narrative and individual coping-skills training (Figure 17 and Figure 18). Only 3.6% of mothers and 9.1% of school-age children found the intervention *strongly* or *very strongly distressing* (Figure 19).

The results of these subjective ratings demonstrate that the intervention was generally perceived as not being distressing, while mothers of young children typically found the intervention helpful, whereas school-age children and their parents found the intervention only little helpful. Hence, perception of the intervention's helpfulness might have been for a factor among the mothers of pre-schoolers, but not among school-age children or their parents. Unfortunately, whether any form of psychological assistance would have been desired was not assessed. This would have shed light on the needs of high-risk school-age children and their parents. Do they want early assistance or not? If not, this might negatively influence their overall appraisal of the intervention's helpfulness, and this should clearly be assessed in future research. Satisfaction ratings for isolated intervention elements should be assessed as well. Moreover, satisfaction with the intervention only was queried six months after the child had been involved in the accident, which might have biased appraisals. The information would be less biased if assessed directly before (desire for an intervention) and shortly after the intervention is provided (perceived satisfaction with, and distress caused by the intervention).

Disentangling the effectiveness of isolated intervention elements could be another aim of further research. Our meta-analysis revealed that early psychological interventions are helpful in school-age children. Psycho-education, coping-skills training and, potentially, trauma narratives should be included in early interventions. Moreover, parents should be incorporated into each intervention. This said, evidence supporting the effectiveness of these intervention elements is limited, and requires confirmation via further research. Only a few published studies are available, and they suffer from diverse methodological quality and findings, especially with regards to which outcome variable(s) best reflected the intervention's efficacy. Because it is now known that some beneficial effects can be expected from early intervention in school-age children, two different interventions could be compared. For instance, one group could be provided with psycho-education only, whereas the other group could receive training in individual coping-skills (Figure 20, option A).

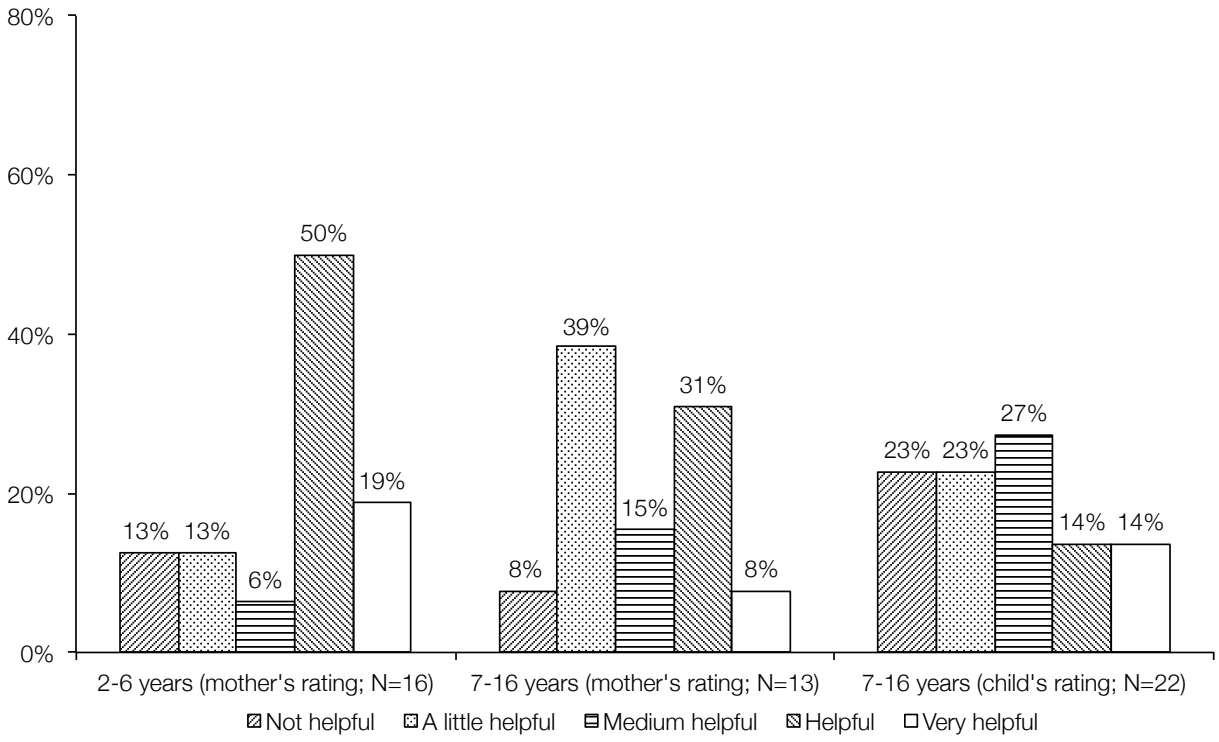


Figure 17.
Ratings of overall satisfaction with the intervention (how helpful was it?)

Figure 18.
Ratings of overall satisfaction with the information leaflet (how helpful was it?)

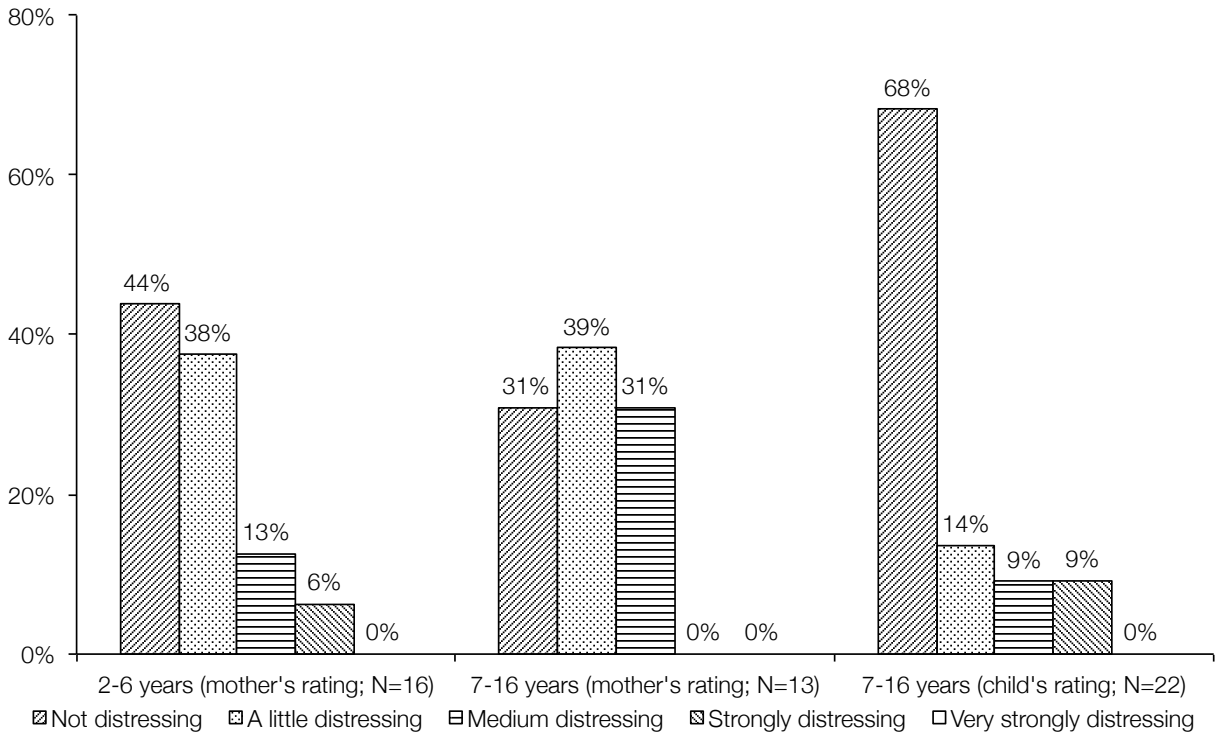


Figure 19.
Ratings of perceived distress caused by the intervention

Future studies also should focus on including children younger than seven years of age, because our study remains to date the only one to have tested the efficacy of any early post-trauma intervention in pre-school children. No published studies involving children younger than two years old exist at all.

Prospective randomized controlled trials are necessary to determine the effectiveness of early interventions in traumatized children, with blinded interviewers performing all follow-up assessments. Data should be analyzed to identify the treatment effects in the time periods of interest. For instance, an ANCOVA's significant time by treatment effect does not reveal whether the course from baseline to follow-up 1 differs significantly between the groups or from baseline to follow-up 2. For this purpose, longitudinal mixed models are suggested (Llabre, Spitzer, Siegel, Saab, & Schneiderman, 2004; Vickers, 2005).

Elaborate statistical analyses are only powerful if they can be applied to a sufficiently large sample. Inadequate statistical power is a frequent issue in intervention studies. Often, many families decline participation or are lost to follow-up. Using a step-wise, risk-based protocol that excludes individuals who screen as low risk exacerbates this problem of inadequate numbers, but is desirable because it reduces study costs and the likelihood of dampening treatment effects due to high rates of spontaneous recovery among controls. Possible approaches to this problem include multi-centre studies or lengthening the time for recruitment. Both approaches increase costs and time spent in data collection, however.

Supervising a number of interviewers and therapists conducting the intervention might present further challenges.

To improve a screening instrument's low specificity, the screening instrument can be administered twice. Within the first days after the trauma, the screening instrument could be administered for the first time. Some days later, when the baseline assessment is due to be carried out, children could be screened for a second time. If they then no longer screen at high risk, they should be allocated to the low-risk condition and the baseline assessment not conducted; neither should the child be randomized to the experimental condition. This procedure would prevent children who recover until the baseline assessment from being included in the intervention study. It should be noted that this procedure is only feasible with screening instruments that assess behavior-related predictors. With the PEDS-ES and the TSQ/10, such a procedure would be possible. However, because for instance, the STEPP and the STEPP-AUS (Section 1.4) also assess non-behavior related predictors (e.g., heart rate immediately after the accident), they could not be used within a double-screening protocol.

To make it possible for both the intervention effect and the influence of the baseline-assessment to be analyzed, a design with two control groups could be used. With this design, the baseline assessment would only be performed in one of the two control groups. However, although such a design might clarify the impact that the baseline assessment has on the control condition, it would be difficult practically to orchestrate, mainly because of the inordinately large sample size that would be required.

Figure 20 depicts a research design that addresses the afore-mentioned considerations. Because it is often difficult to recruit a sufficiently large sample, one must decide whether intervention elements should be tested separately (option A); whether a control condition without any baseline assessment should be included (option B); or whether neither should be done (option C). It would also be possible to combine these variations, but this would necessitate at least four experimental groups and a considerably larger sample (option D). The suggested design in Figure 20 also includes early-risk screening. As discussed earlier, providing early support only to individuals at risk is a reasonable practice.

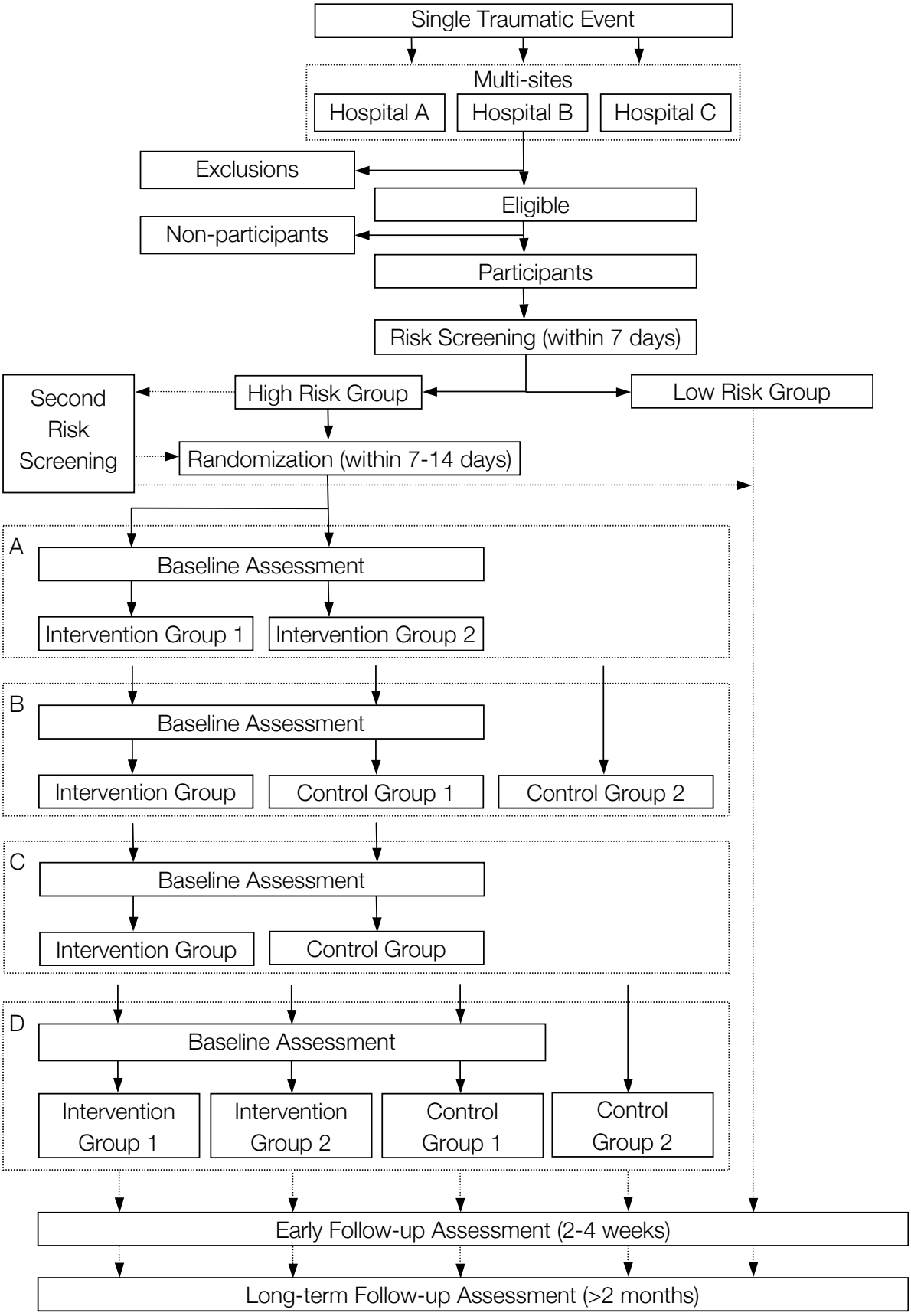


Figure 20.
Possible study designs for future research

5.5 Clinical Implications

The findings of this dissertation have a variety of clinical implications. Our meta-analysis revealed that early interventions are helpful in school-age children who have experienced a single traumatic event. Moreover, suggestions with regards to which intervention elements to use can be made. School-age children after a single traumatic event should be provided with psycho-education and training in individual coping-skills. Potentially, some form of trauma exposure (like a trauma narrative) could be included. There also was evidence that providing more than one intervention session is more effective than not. Parents should always be included in early psychological help after trauma. Finally, a step-wise, risk-based protocol — in which children at low risk for long-term psychological problems are screened out and only children at high risk offered an intervention — was shown to be both reasonable and economical.

The results of our randomized clinical trial suggest that, at least for school-age children, these suggestions are valid. We found tentative evidence that school-age children recover more quickly after unintentional injury if they are involved in structured trauma retelling, and if provided with psycho-education and individual coping-skills training. However, to what extent these elements contributed to our enhanced outcomes remains speculative. Despite these promising findings, many children ages 7-16 years and their parents indicated that the intervention was not helpful to them. Therefore, it also should be taken into account for older children whether or not early psychological help is desired or considered necessary. Clearly, in actual practice it may be impossible to enforce treatment on a family that does not wish it.

Conversely, for pre-school children, it remains unclear whether or not early intervention is helpful, or what intervention elements could help these children and their parents. There are, nevertheless, suggestions to be made for this age-group. The findings of the PEDS-ES evaluation demonstrated that early risk screening is both feasible and economical in young children. Consequently, there is both evidence and the required tool (PEDS-ES) available to adopt a “watchful waiting” protocol with traumatized pre-schoolers. Psycho-education and providing the contact addresses of appropriate professionals could be appropriate for children at low risk of long-term psychological maladjustment (Landolt, 2012). For children at high risk, professionals should monitor families closely for their needs. Family concerns and questions could be addressed by providing established psychological and educational treatment. For instance, a child’s sleeping problems could be treated as per Jenni and Benz (2007), and conduct problems (e.g., aggression) with the Positive Parenting Program (Triple P; Sanders, 1999) which has been shown to be effective (Nowak & Heinrichs, 2008). Nevertheless, as no deleterious effects were identified in pre-school children who received the EPICAP intervention we developed, the contained intervention elements could still be used (e.g., psycho-education for parents regarding a child’s PTSD symptoms). Moreover, parents

of pre-school children perceived the intervention as being helpful, which supports the view that early interventions could be provided in this age-group. Parents might feel reassured if they have ready access to a professional counsellor and are instructed in how to best handle a child's acute stress symptoms. Also, early interventions in young children should probably focus on parent-child interactions, as well as on parental posttraumatic distress. To address parental posttraumatic stress, trauma reconstruction could also be done with the parents alone. To directly intervene with young children, concrete trauma exposure (e.g., visiting the place where the accident happened) might be more effective than constructing a trauma narrative using toys. However, to date, no published evidence exists proving that these methods are effective in the early stages post-trauma in pre-school children.

In summary, the use of a step-wise, risk-based protocol is reasonable for all ages. Moreover, given that early interventions appear not to be harmful, it might be better to provide the evaluated early intervention elements (e.g. psycho-education) than do nothing. Families experience great distress in the immediate aftermath of a child's traumatic event. Consequently, early interventions should focus not only on the psychological long-term impact of the intervention, but also on its immediate impact, since reducing acute individual and familial stress within the first days of a traumatic event is of value as well.

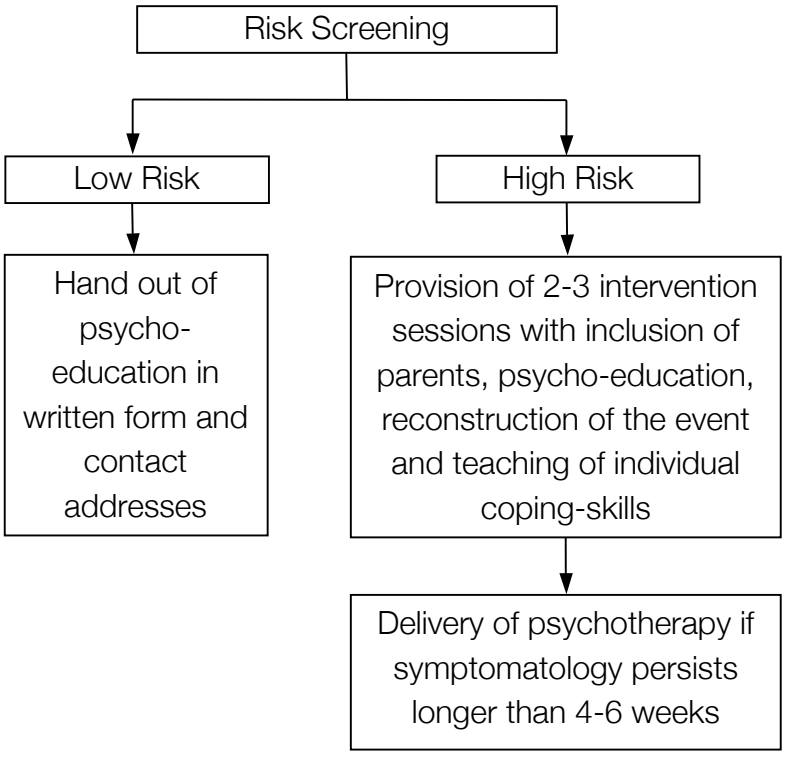


Figure 21.
Suggested step-wise, risk-based practice protocol for early psychological interventions following a single traumatic event in a child or adolescent (Landolt, 2012, p. 115; translated by the author).

For all these reasons, the step-wise protocol depicted in Figure 21 (adapted from Landolt, 2012, p. 115) can be recommended for use in clinical practice. Available screening instruments for pre-school and school age children have been presented in Section 3 (PEDS-ES; Kramer et al., 2013) and 1.4 (CTSQ; Kenardy et al., 2006; STEPP-AUS; Nixon et al., 2010; STEPP; Winston et al., 2003), respectively.

5.6 General Conclusions

Single traumatic events are frequent among children of all ages, and a considerable number suffer from long-lasting psychological sequelae. The aim of this thesis was to learn more about the early detection of children at risk for long-term psychological maladjustment and how to best provide early intervention for these children. The most notable findings of this thesis are: First, early interventions are effective in school-age children after single-event trauma. It can therefore be suggested that older children be provided with early interventions after single traumatic events. Second, intervention elements that are probably effective are psycho-education, individual coping-skills training and, probably, some type of trauma exposure (like a trauma narrative). For such treatment, parents should be included, more than one intervention session should be held, and the protocol for management should be step-wise, starting with risk screening, followed by early intervention only for children at risk. Third, for the first time, an early screening instrument for pre-school children (PEDS-ES) was successfully evaluated and put into the hands of researchers, clinicians and parents. This closes a gap in research and clinical practice in this age-group, and enables the use of a step-wise, risk-based practice protocol with young children. Fourth, the efficacy of a specific, two-session, multi-faceted early psychological intervention for children ages 2-16 years was evaluated. Despite the availability of a small number of somewhat comparable studies in school-age children, further methodologically-sound studies are needed, that are prospective, randomized and controlled, and are large enough, in terms of subject numbers, to detect small to intermediate effect sizes and to allow for comparisons between different elements of treatment. For instance, it is still unclear which intervention elements are most helpful. Because the efficacy of early interventions in children is limited, further research also might focus on the subjective needs of families after traumatic events. For pre-school children, our RCT failed to identify any measureable intervention effects. However, because many families claimed that the intervention was helpful and no deleterious effects were observed, at least for pre-schoolers at risk, the EPICAP intervention seems appropriate and safe for use. The mere feeling of having a supportive counselor available might reduce distress during the acute phase of a traumatic event. Further research could therefore study the short-term impact of early interventions on acute stress in parents and children. It also can be suggested that early interventions in young children should also focus on the quality of parent-child relationships and on parental distress. Finally, based upon their stage of cognitive development, young

children might profit from *in-vivo* exposure, a therapeutic option that has not yet been studied in the early post-trauma setting.

REFERENCES

Achenbach, T. (1991). *Manual for the Child Behavior Checklist/4-18 and 1991 Profile*. Burlington, VT: University of Vermont, Department of Psychiatry.

Achenbach, T. M., & Rescorla, L. A. (2000). *Manual for the Aseba preschool forms & profiles*. Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.

Alisic, E., Jongmans, M. J., van Wesel, F., & Kleber, R. J. (2011). Building child trauma theory from longitudinal studies: a meta-analysis. *Clinical Psychology Review, 31*(5), 736-747.

Alisic, E., van der Schoot, T. A., van Ginkel, J. R., & Kleber, R. J. (2008). Looking beyond posttraumatic stress disorder in children: posttraumatic stress reactions, posttraumatic growth, and quality of life in a general population sample. *The Journal of Clinical Psychiatry, 69*(9), 1455-1461.

Altman, D. G., & Bland, J. M. (1994). Diagnostic tests 2: Predictive values. *BMJ, 309*(6947), 102.

American Academy of Child and Adolescent Psychiatry. (1998). Practice parameters for the assessment and treatment of children and adolescents with posttraumatic stress disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*(10 Suppl), 4S-26S.

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders, 3rd edition*. Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1987). *Diagnostic and Statistical Manual of Mental Disorders, 3rd edition, revised (DSM-III-R)*. Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision (DSM-IV-TR)*. Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2012). Proposed revisions for Posttraumatic Stress Disorder in DSM-5 Retrieved 2012-07-26, from http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=165

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*. Arlington, VA: American Psychiatric Association.

Anderson, C. M., Hogarty, G. E., & Reiss, D. J. (1980). Family treatment of adult schizophrenic patients: a psycho-educational approach. *Schizophrenia Bulletin, 6*(3), 490-505.

Antonovsky, A. (1987). *Unraveling the mystery of health: How people manage stress and stay well*. San Francisco: Jossey-Bass.

Arbeitsgruppe Deutsche Child Behavior Checklist. (2002). *Elternfragebogen für Klein- und Vorschulkinder (CBCL 1½-5)*. *[Parent report on the behavior of infants and preschool age children (CBCL 1½-5)]*. Köln: Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik (KJFD).

Baker, S. P., O'Neill, B., Haddon, W., Jr., & Long, W. B. (1974). The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. *The Journal of Trauma, 14*(3), 187-196.

Bakker, A., Van Loey, N. E., Van Son, M. J., & Van der Heijden, P. G. (2010). Brief report: mothers' long-term posttraumatic stress symptoms following a burn event of their child. *Journal of Pediatric Psychology, 35*(6), 656-661.

Bäuml, J., Froböse, T., Kraemer, S., Rentrop, M., & Pitschel-Walz, G. (2006). Psychoeducation: A basic psychotherapeutic intervention for patients with Schizophrenia and their families. *Schizophrenia Bulletin, 32*(S1), S1-S9.

Berkowitz, S. J., Stover, C. S., & Marans, S. R. (2011). The Child and Family Traumatic Stress Intervention: Secondary prevention for youth at risk of developing PTSD. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 52*(6), 676-685.

bfs – Bundesamt für Statistik. (2011). Krankenhausbehandlung - Detaillierte Daten. Standardtabellen: 2010. [Inpatient treatment - in detail data. Standardized tables: 2010]. Retrieved 05-01-2012, from bfs http://www.bfs.admin.ch/bfs/portal/de/index/themen/14/04/01/data/01.html; http://www.bfs.admin.ch/bfs/portal/de/index/themen/01/02/blank/key/alter/gesamt.html

Bonanno, G. A. (2004). Loss, trauma, and human resilience. *American Psychologist, 59*, 20-28.

Bonanno, G. A., & Mancini, A. D. (2008). The human capacity to thrive in the face of potential trauma. *Pediatrics, 121*(2), 369-375.

Brosbe, M. S., Hoefling, K., & Faust, J. (2011). Predicting Posttraumatic Stress Following Pediatric Injury: A Systematic Review. *J Pediatr Psychol*.

Brusselaers, N., Monstrey, S., Vogelaers, D., Hoste, E., & Blot, S. (2010). Severe burn injury in Europe: a systematic review of the incidence, etiology, morbidity, and mortality. *Critical Care, 14*(5), R188.

Bryant, R. A., & Harvey, A. G. (2002). Delayed-onset posttraumatic stress disorder: a prospective evaluation. *Australian & New Zealand Journal of Psychiatry, 36*, 205-209.

Brymer, M., Jacobs, A., Layne, C., Pynoos, R., Ruzek, J., Steinberg, A., Vernberg, E., & Watson, P. (2006). National Child Traumatic Stress Network and National Center for PTSD. Psychological First Aid: Field Operations Guide. 2nd Edition., http://www.nctsn.org http://www.ncptsd.va.gov

Caplan, G. (1964). *Principles of preventive psychiatry*. New York: Basic Books, Inc.

Cella, D. F., Perry, S. W., Kulchycky, S., & Goodwin, C. (1988). Stress and coping in relatives of burn patients: a longitudinal study. *Hospital & community psychiatry, 39*(2), 159-166.

Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported therapies. *Journal of Consulting and Clinical Psychology, 66*(1), 7-18.

Chapman, L., Morabito, D., Ladakakos, C., Schreier, H., & Knudson, M. (2001). The Effectiveness of Art Therapy Interventions in Reducing Post Traumatic Stress Disorder (PTSD) Symptoms in Pediatric Trauma Patients *Art Therapy: Journal of the American Art Therapy Association, 18*(2), 100-104.

Chemtob, C. M. (2000). Delayed debriefing after a disaster. In B. Raphael & J. P. Wilson (Eds.), *Psychological debriefing: theory, practice and evidence*. Cambridge: Cambridge University Press.

Chemtob, C. M., Nomura, Y., & Abramovitz, R. A. (2008). Impact of conjoined exposure to the World Trade Center attacks and to other traumatic events on the behavioral problems of preschool children. *Archives of Pediatrics & Adolescent Medicine, 162*(2), 126-133.

Children and War Foundation. (1998). Children's Revised Impact of Event Scale (8) (CRIES-8). Retrieved 04-06-2011 http://www.childrenandwar.org/measures/

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.

Cohen, J., Mannarino, A. P., & Deblinger, E. (2009). *Traumafokussierte kognitive Verhaltenstherapie bei Kindern und Jugendlichen. [Traumafocused cognitive-behavioral therapy in children and adolescents]*. Berlin: Springer.

Cohen, J. A., Mannarino, A. P., & Iyengar, S. (2011). Community treatment of posttraumatic stress disorder for children exposed to intimate partner violence: a randomized controlled trial. *Archives of Pediatrics and Adolescent Medicine, 165*(1), 16-21.

Committee on Injury Scaling: The Abbreviated Injury Scale - 1980 Revision. American Association for Automotive Medicine, Morton Grove, IL 60053.

Copeland, W. E., Keller, G., Angold, A., & Costello, E. J. (2007). Traumatic events and posttraumatic stress in childhood. *Archives of General Psychiatry, 64*, 577-584.

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2008). A meta-analysis of risk factors that predict psychopathology following accidental trauma. *Journal for Specialists in Pediatric Nursing, 13*(2), 98-110.

Cox, C. M., Kenardy, J. A., & Hendrikz, J. K. (2010). A randomized controlled trial of a web-based early intervention for children and their parents following unintentional injury. *Journal of Pediatric Psychology, 35*(6), 581-592.

Cukor, J., Olden, M., Lee, F., & Difede, J. (2010). Evidence-based treatments for PTSD, new directions, and special challenges. *Annals of the New York Academy of Science, 1208*, 82-89.

Dalgleish, T., Meiser-Stedman, R., & Smith, P. (2005). Cognitive Aspects of Posttraumatic Stress Reactions and their Treatment in Children and Adolescents: An Empirical Review and Some Recommendations. *Behavioural and Cognitive Psychotherapy, 33*(4), 459–486.

De Young, A. C., Kenardy, J. A., & Cobham, V. E. (2011a). Diagnosis of posttraumatic stress disorder in preschool children. *Journal of Clinical Child and Adolescent Psychology, 40*(3), 375-384.

De Young, A. C., Kenardy, J. A., & Cobham, V. E. (2011b). Trauma in early childhood: a neglected population. *Clinical Child and Family Psychology Review, 14*(3), 231-250.

De Young, A. C., Kenardy, J. A., Cobham, V. E., & Kimble, R. (2012). Prevalence, comorbidity and course of trauma reactions in young burn-injured children. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 53*(1), 56-63.

Deblinger, E., Mannarino, A. P., Cohen, J. A., Runyon, M. K., & Steer, R. A. (2011). Trauma-focused cognitive behavioral therapy for children: impact of the trauma narrative and treatment length. *Depression and Anxiety, 28*(1), 67-75.

Dehon, C., & Scheeringa, M. S. (2006). Screening for preschool posttraumatic stress disorder with the Child Behavior Checklist. *Journal of Pediatric Psychology, 31*(4), 431-435.

Dilling, H., Mombour, W., & Schmidt, M. H. (Eds.). (1991). *Internationale Klassifikation psychischer Störungen. ICD 10, Kapitel V (F). [International Statistical Classification of Diseases and Related Health Problems (ICD-10) - Chapter V (F): Mental and behavioral disorders]*. Bern: Huber.

Domenech, J. M. (2008). SPSS Macro !DT. Diagnostic Tests (Version 2008.05.27): Universitat Autònoma de Barcelona. Retrieved from [http://www.metodo.uab.cat/macros.htm] webcite Bellaterra

Döpfner, M., & Kinnen, C. (2011). Elternfragebogen über das Verhalten von Kindern und Jugendlichen (CBCL 4-18). [Parent report an the behavior of children and adolescents (CBCL 4-18)]. In C. Barkmann, M. Schulte- Markwort & E. Brähler (Eds.), *Klinisch-psychiatrische Ratingskalen für das Kindes- und Jugendalter* (6 ed., pp. 95-99). Göttingen: Hogrefe.

Durlak, J. A. (2009). How to select, calculate, and interpret effect sizes. *Journal of Pediatric Psychology, 34*(9), 917-928.

Dyregrov, A. (1991). *Grief in children: a handbook for adults*. London: Jessica Kingsley.

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behaviour Research and Therapy, 38*(4), 319-345.

Elklit, A. (2002). Victimization and PTSD in a Danish national youth probability sample. *Journal of the American Academy of Child and Adolescent Psychiatry, 41*, 174-181.

Essau, C. A., Conradt, J., & Petermann, F. (1999). Häufigkeit der posttraumatischen Belastungsstörung bei Jugendlichen: Ergebnisse der Bremer Jugendstudie. [Frequency of the posttraumatic stress disorder in adolescents: Result of the Bremen youth study]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie, 27*, 37-45.

Everly, G. S., & Mitchell, J. T. (2002). *CISM - Stressmanagement nach kritischen Ereignissen. [CISM stress management after critical events]*. Wien: Facultas Universitätsverlag.

Eyberg, S. M., & Ross, A. W. (1978). Assessment of child behavior problems: The validation of a new inventory. *Journal of Clinical Child Psychology, 7*, 113-116.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods, 39*(2), 175-191.

Fletcher, K. E. (1996). Childhood posttraumatic stress disorder. In E. J. Mash & R. Barkley (Eds.), *Child Psychopathology* (pp. 242–276). New York: Guilford Press.

Foa, E. B., Hembree, E. A., & Rothbaum, B. O. (2007). *Prolonged exposure therapy for PTSD: Emotional processing of traumatic experiences*. New York: Oxford University Press.

Foa, E. B., Steketee, B., & Rothbaum, B. O. (1989). Behavioral/cognitive conceptualizations of post-traumatic stress disorder. *Behavior Therapy, 20*(2), 155-176.

Frederick, C., Pynoos, R., & Nader, K. (1992). *Childhood posttraumatic stress reaction index - a copyrighted instrument*. Los Angeles: University of California.

Frederick, C. J. (1985). Children traumatized by catastrophic situations. In S. Eth & R. S. Pynoos (Eds.), *Post-traumatic stress disorder in children* (pp. 71-99). Washington, DC: American Psychiatric Press.

Frühe, B. (2007). *Checkliste zur Akuten Belastung – Diagnostik und Zusammenhang akuter und posttraumatischer Belastung bei Kindern und Jugendlichen. [Checklist for Acute Stress - Diagnosis and connection between acute and posttraumatic stress in children and adolescents]*. Diplomarbeit, Ludwig-Maximilians-Universität, München.

Fruhe, B., Kultalahti, T. T., Rothlein, H. J., & Rosner, R. (2008). Vorhersagbarkeit posttraumatischer Belastung bei Kindern und Jugendlichen nach traumatischen Ereignissen in der Schule.

[Prediction of posttraumatic stress in children and adolescents after traumatic events at school]. *Kindheit und Entwicklung, 17*(4), 219-223.

Ghesquiere, A., Fan, M. Y., Berliner, L., Rivara, F. P., Jurkovich, G. J., Russo, J., Katon, W., & Zatzick, D. F. (2008). Adolescents' and parents' agreement on posttraumatic stress disorder symptoms and functioning after adolescent injury. *Journal of Traumatic Stress, 21*(5), 487-491.

Giaconia, R. M., Reinherz, H. Z., Silverman, A. B., Pakiz, B., Frost, A. K., & Cohen, E. (1995). Traumas and posttraumatic stress disorder in a community population of older adolescent. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 1369-1380.

Gillies, M. L., Barton, J., & Di Gallo, A. (2003). Follow-up of young road accident victims. *J Trauma Stress, 16*, 523-526.

Graf, A., Irblich, D., & Landolt, M. A. (2008). Posttraumatische Belastungsstoerungen bei Saeuglingen und Kleinkindern. [Posttraumatic stress disorder in infants and toddlers]. *Praxis der Kinderpsychologie und Kinderpsychiatrie, 57*(4), 247-263.

Graf, A., Schiestl, C., & Landolt, M. A. (2011). Posttraumatic Stress and Behavior Problems in Infants and Toddlers With Burns. *Journal of Pediatric Psychology, 36*(8), 923-931.

Grawe, K., Donati, R., & Bernauer, F. (2004). *Psychotherapie im Wandel. Von der Konfession zur Profession*. *[Psychotherapy in change. From confession to profession]*. Göttingen, Germany: Hogrefe.

Green, B. L., Korol, M., Grace, M. C., Vary, M. G., Leonard, A. C., Gleser, G. C., & Smitson-Cohen, S. (1991). Children and disaster: age, gender, and parental effects on PTSD symptoms. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*(6), 945-951.

Greenspan, L., McLellan, B. A., & Greig, H. (1985). Abbreviated Injury Scale and Injury Severity Score: a scoring chart. *The Journal of Trauma, 25*(1), 60-64.

Haas, E., & Goldbeck, L. (2010). *Screening von Kindern nach Unfällen auf akute und posttraumatische Belastungssymptome. [Screening of children after accidental injuries for posttraumatic stress symptoms]*. Thesis, University, Ulm.

Hayes, R., & Gantt, A. (1992). Patient psychoeducation: the therapeutic use of knowledge for the mentally ill. *Social Work in Health Care, 17*(1), 53-67.

Hedges, L. V. (1981). Distribution theory for Glass's estimator of effect size and related estimators. *Journal of Educational Statistics, 6*, 107-128.

Hobbs, M., & Mayou, R. (2000). Debriefing and motor accidents: Interventions and outcomes. In B. Raphael & J. P. Wilson (Eds.), *Psychological debriefing: Theory, practice and evidence* (pp. 145–160). Cambridge: Cambridge University Press.

Holahan, C. J., & Moos, R. H. (1981). Social support and psychological distress: a longitudinal analysis. *Journal of Abnormal Psychology, 90*(4), 365-370.

Houck, C. D., Rodrigue, J. R., & Lobato, D. (2007). Parent-adolescent communication and psychological symptoms among adolescents with chronically ill parents. *Journal of Pediatric Psychology, 32*(5), 596-604.

Injury Database (IDB) of the European Commission. (2008). DG Health and Consumers, and the Network of National IDB Data Providers. Retrieved 08-13-2013 https://webgate.ec.europa.eu/sanco/heidi/index.php/EU_Injury_Database_(IDB)

Irblich, D., & Hepton, Y. (2006). *Posttraumatische Belastungsstörung - Semistrukturiertes Interview und Beobachtungsbogen für Säuglinge und Kleinkinder. PTSDSSI-D. [Posttraumatic Stress Disorder - Semi-structured Interview and Observational Record for Infants and Young Children. PTSDSSI-D]*. Unpublished manuscript. Auel, Sozialpaediatrisches Zentrum.

Jenni, O. G., & Benz, C. (2007). Schlafstörungen. [Sleeping Disorders]. *Pädiatrie up2date, 4*.

Kahana, S. Y., Feeny, N. C., & Youngstrom, E. A. (2006). Posttraumatic stress in youth experiencing illnesses and injuries: An exploratory meta-analysis. *Traumatology, 12*, 148-161.

Kardiner, A., & Spiegel, H. (1947). *War, Stress and Neurotic Illness*. New York: Hoeber.

Kassam-Adams, N. (2006). The Acute Stress Checklist for Children (ASC-Kids): development of a child self-report measure. *Journal of Traumatic Stress, 19*(1), 129-139.

Kassam-Adams, N., Felipe Garcia-Espana, J., Marsac, M. L., Kohser, K. L., Baxt, C., Nance, M., & Winston, F. (2011). A pilot randomized controlled trial assessing secondary prevention of traumatic stress integrated into pediatric trauma care. *Journal of Traumatic Stress, 24*(3), 252-259.

Kassam-Adams, N., Garcia-Espana, J. F., Miller, V. A., & Winston, F. (2006). Parent-Child Agreement Regarding Children's Acute Stress: The Role of Parent Acute Stress Reactions. *Journal of the American Academy of Child & Adolescent Psychiatry, 45*(12), 1485-1493.

Kassam-Adams, N., Marsac, M. L., & Cirilli, C. (2010). Posttraumatic stress disorder symptom structure in injured children: functional impairment and depression symptoms in a confirmatory factor analysis. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(6), 616-625.

Kazak, A. E., Kassam-Adams, N., Schneider, S., Zelikovsky, N., Alderfer, M. A., & Rourke, M. (2006). An integrative model of pediatric medical traumatic stress. *Journal of Pediatric Psychology, 31*(4), 343-355.

Kenardy, J. A., Spence, S. H., & Macleod, A. C. (2006). Screening for posttraumatic stress disorder in children after accidental injury. *Pediatrics, 118*(3), 1002-1009.

Kenardy, J. A., Thompson, K., Le Brocque, R., & Olsson, K. (2008). Information-provision intervention for children and their parents following pediatric accidental injury. *European Child & Adolescent Psychiatry, 17*(5), 316-325.

Kovacs, M. (1985). The Children's Depression Inventory (CDI). *Psychopharmacology Bulletin, 21*(4), 995-999.

Kramer, D. N., Hertli, M. B., & Landolt, M. A. (2013). Evaluation of an early risk screener for PTSD in preschool children after accidental injury. *Pediatrics, 132*(4), e945-e951 http://pediatrics.aappublications.org/content/132/4/e945.long

Kramer, D. N., & Landolt, M. A. (2011). Characteristics and efficacy of early psychological interventions in children and adolescents after single trauma: a meta-analysis. *European Journal of Psychotraumatology, 2*: 7858, http://www.eurojnlofpsychotraumatol.net/index.php/ejpt/article/view/7858

Kramer, D. N., & Landolt, M. A. (submitted). Early psychological intervention in accidentally-injured children ages 2-16 years: a randomized controlled trial. *Journal of Pediatric Psychology*.

Kronenberg, M. E., Hansel, T. C., Brennan, A. M., Osofsky, H. J., Osofsky, J. D., & Lawrason, B. (2010). Children of Katrina: lessons learned about postdisaster symptoms and recovery patterns. *Child Development, 81*(4), 1241-1259.

Landolt, M. A. (2003). Die Bewaeltigung akuter Psychotraumata im Kindesalter. [Coping with acute psychological trauma in childhood]. *Praxis der Kinderpsychologie und Kinderpsychiatrie, 52*(2), 71-87.

Landolt, M. A. (2012). *Psychotraumatologie des Kindesalters. Grundlagen, Diagnostik und Interventionen. [Psychotraumatology of childhood. Basics, diagnostics and interventions]*. (2nd ed.). Goettingen: Hogrefe.

Landolt, M. A., Buehlmann, C., Maag, T., & Schiestl, C. (2009a). Brief Report: Quality of Life Is Impaired in Pediatric Burn Survivors with Posttraumatic Stress Disorder. *Journal of Pediatric Psychology, 34*(1), 14-21.

Landolt, M. A., & Hensel, T. (Eds.). (2012). *Traumatherapie bei Kindern und Jugendlichen. [Trauma therapy with children and adolescents]* (2nd ed.). Goettingen: Hogrefe.

Landolt, M. A., Marti, D., Widmer, J., & Meuli, M. (2002a). Does cartoon movie distraction decrease burned children's pain behavior? *Journal of Burn Care and Rehabilitation, 23*, 61-65.

Landolt, M. A., Schnyder, U., Maier, T., Schoenbucher, V., & Mohler-Kuo, M. (2013). Trauma Exposure and Posttraumatic Stress Disorder in Adolescents: A National Survey in Switzerland. *Journal of Traumatic Stress, 26*(2), 209-216.

Landolt, M. A., Vollrath, M., & Ribi, K. (2002b). Predictors of coping strategy selection in paediatric patients. *Acta Paediatrica, 91*(9), 954-960.

Landolt, M. A., Vollrath, M., Ribi, K., Timm, K., Sennhauser, F. H., & Gnehm, H. E. (2003). Inzidenz und Verlauf posttraumatischer Belastungsreaktionen nach Verkehrsunfällen im Kindesalter. [Incidence and course of posttraumatic stress reactions in children after road traffic accidents]. *Kindheit und Entwicklung, 12*(3), 184-192.

Landolt, M. A., Vollrath, M., Timm, K., Gnehm, H. E., & Sennhauser, F. H. (2005). Predicting posttraumatic stress symptoms in children after road traffic accidents. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*(12), 1276-1283.

Landolt, M. A., Vollrath, M. E., Gnehm, H. E., & Sennhauser, F. H. (2009b). Post-traumatic stress impacts on quality of life in children after road traffic accidents: prospective study. *Australian and New Zealand Journal of Psychiatry, 43*(8), 746-753.

Landolt, M. A., Ystrom, E., Sennhauser, F. H., Gnehm, H. E., & Vollrath, M. E. (2012). The mutual prospective influence of child and parental post-traumatic stress symptoms in pediatric patients. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 53*(7), 767-774.

Landsverk, S. S., & Kane, C. F. (1998). Antonovsky's sense of coherence: theoretical basis of psychoeducation in schizophrenia. *Issues in Mental Health Nursing, 19*(5), 419-431.

Largo, R. H., Molinari, L., Comenale Pinto, L., Weber, M., & Duc, G. (1986). Language development of term and preterm children during the first five years of life. *Developmental Medicine and Child Neurology, 28*(3), 333-350.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Le Brocque, R. M., Hendrikz, J., & Kenardy, J. A. (2010). The course of posttraumatic stress in children: examination of recovery trajectories following traumatic injury. *Journal of Pediatric Psychology, 35*(6), 637-645.

Lindemann, E. (1944). Symptomatology and management of acute grief. *American Journal of Psychiatry, 101*(2), 141-148.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. (Vol. 49). Thousand Oaks: Sage.

Llabre, M. M., Spitzer, S., Siegel, S., Saab, P. G., & Schneiderman, N. (2004). Applying latent growth curve modeling to the investigation of individual differences in cardiovascular recovery from stress. *Psychosomatic Medicine, 66*(1), 29-41.

Mallinckrodt, B., & Wang, C. (2004). Quantitative methods for verifying semantic equivalence of translated research instruments: A Chinese version of the experiences in close relationships scale. *Journal of Counseling Psychology, 51*(3), 368–379.

Marshall, S. L. A. (1944). *Island victory*. New York: Penguin Books.

Marshall, S. L. A. (1947). *Men under fire: The problem of battle command in future war*. New York: William Morrow.

Masten, A. S., & Obradovic, J. (2008). Disaster Preparation and Recovery: Lessons from Research on Resilience in Human Development. *Ecology and Society, 13*(1): 9, <Go to ISI>://000261176100011

Mayer, T., Matlak, M. E., Johnson, D. G., & Walker, M. L. (1980). The Modified Injury Severity Scale in pediatric multiple trauma patients. *Journal of Pediatric Surgery, 15*, 719-726.

Meiser-Stedman, R., Smith, P., Glucksman, E., Yule, W., & Dalgleish, T. (2008). The posttraumatic stress disorder diagnosis in preschool- and elementary school-age children exposed to motor vehicle accidents. *American Journal of Psychiatry, 165*, 1326-1337.

Mitchell, J. T. (1983). When disaster strikes. The Critical Incident Stress Debriefing. *Journal of Emergency Medical Services, 13*, 49-52.

Mitchell, J. T., & Everly, G. S. (1993). *Critical incident stress debriefing: an operations manual for the prevention of trauma among emergency service and disaster workers*. Baltimore: Chevron Publishing.

Mitchell, J. T., & Everly, G. S. (1997). *Critical Incident Sress Debriefing. An Operations Manual for the Prevention of Traumatic Stress among Emergency Services and Disaster Works*. (2nd Edition ed.). Ellicott City: Chevron Publishing Corporation.

Mowrer, O. H. (1960). *Learning theory and behavior*. New York: Wiley.

Nader, K. O., Kriegler, J. A., Blake, D. D., Pynoos, R. S., Newman, E., & Weather, F. W. (2002). *The Clinician-Administered PTSD Scale, Child and Adolescent Version (CAPS-CA)*. White River Junction: National Center for PTSD.

National Center for Injury Prevention and Control. (2011). Overall unintentional nonfatal injuries and rates per 100,000, united states, all races, both sexes. Retrieved February 21, 2013 http://www.cdc.gov/ncipc/wisqars/

Neuner, F., Catani, C., Ruf, M., Schauer, E., Schauer, M., & Elbert, T. (2008). Narrative exposure therapy for the treatment of traumatized children and adolescents (KidNET): from neurocognitive theory to field intervention. *Child and Adolescent Psychiatric Clinics of North America, 17*(3), 641-664.

Nixon, R. D., Ellis, A. A., Nehmy, T. J., & Ball, S. A. (2010). Screening and predicting posttraumatic stress and depression in children following single-incident trauma. *Journal of Clinical Child and Adolescent Psychology, 39*(4), 588-596.

Nowak, C., & Heinrichs, N. (2008). A comprehensive meta-analysis of Triple P-Positive Parenting Program using hierarchical linear modeling: effectiveness and moderating variables. *Clinical Child and Family Psychology Review, 11*(3), 114-144.

Olofsson, E., Bunketorp, O., & Andersson, A. L. (2009). Children and adolescents injured in traffic--associated psychological consequences: a literature review. *Acta Paediatrica, 98*(1), 17-22.

Perkonigg, A., Pfister, H., Stein, M. B., Höfler, M., Lieb, R., Maercker, A., & Wittchen, H.-U. (2005). Longitudinal course of posttraumatic stress disorder and posttraumatic stress disorder symptoms in a community sample of adolescents and young adults. *American Journal of Psychiatry, 162*, 1320-1327.

Perrin, S., Meiser-Stedman, R., & Smith, P. (2005). The children's revised impact of event scale (CRIES): Validity as a screening instrument for PTSD. *Behavioural and Cognitive Psychotherapy, 33*(4), 487-498.

Plück, J., & Döpfner, M. (2011). Elternfragebogen für Klein- und Vorschulkinder (CBCL 1 1/2-5). [Parent report for toddlers and preschool children (CBCL 1 1/2-5)]. In C. Barkmann, M. Schulte- Markwort & E. Brähler (Eds.), *Klinisch-psychiatrische Ratingskalen für das Kindes- und Jugendalter* (6 ed., pp. 90-94). Göttingen: Hogrefe.

Poijula, S., Dyregrov, A., Wahlberg, K. E., & Jokelainen, J. (2001). Reactions to adolescent suicide and crisis intervention in three secondary schools. *International Journal of Emergency Mental Health, 3*(2), 97-106.

Pynoos, R. S., & Eth, S. (1986). Witness to violence: the child interview. *Journal of the American Academy of Child and Adolescent Psychiatry, 25*, 306-319.

Pynoos, R. S., Steinberg, A. M., & Piacentini, J. C. (1999). A developmental psychopathology model of childhood traumatic stress and intersection with anxiety disorders. *Biological Psychiatry, 46*, 1542-1554.

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. (2010a). Multiple session early psychological interventions for the prevention of post-traumatic stress disorder. *Cochrane Database of Systematic Reviews, 4*, CD006869 http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=19588408

Roberts, N. P., Kitchiner, N. J., Kenardy, J., & Bisson, J. I. (2010b). Early psychological interventions to treat acute traumatic stress symptoms. *Cochrane Database of Systematic Reviews, 4*, CD007944 http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=20238359

Rose, S. C., Bisson, J., Churchill, R., & Wessely, S. (2009). Psychological debriefing for preventing post traumatic stress disorder (PTSD). *Cochrane Database of Systematic Reviews 1*, CD000560

Salmon, T. W. (1919). War neuroses and their lesson. *New York Medical Journal, 109*, 993-994.

Sanders, M. R. (1999). Triple P-Positive Parenting Program: towards an empirically validated multilevel parenting and family support strategy for the prevention of behavior and emotional problems in children. *Clinical Child and Family Psychology Review, 2*(2), 71-90.

Saylor, C. F., Swenson, C. C., Reynolds, S. S., & Taylor, M. (1999). The Pediatric Emotional Distress Scale: A Brief screening measure for young children exposed to traumatic events. *Journal of Clinical Child Psychology, 28*, 70-81.

Scheeringa, M. S. (2006). Posttraumatic stress disorder: Clinical guidelines and research findings. In J. L. Luby (Ed.), *Handbook of preschool mental health: Development, disorders, and treatment* (pp. 165-185). New York: Guilford Press.

Scheeringa, M. S. (2010). *Young Child PTSD Checklist*. New Orleans: Tulane University.

Scheeringa, M. S., Myers, L., Putnam, F. W., & Zeanah, C. H. (2012). Diagnosing PTSD in early childhood: An empirical assessment of four approaches. *Journal of Traumatic Stress, 25*(4), 359-367.

Scheeringa, M. S., Peebles, C. D., Cook, C. A., & Zeanah, C. H. (2001). Toward establishing procedural, criterion, and discrimant validity for PTSD in early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*, 52-60.

Scheeringa, M. S., Weems, C. F., Cohen, J. A., Amaya-Jackson, L., & Guthrie, D. (2011a). Trauma-focused cognitive-behavioral therapy for posttraumatic stress disorder in three-through six year-old children: a randomized clinical trial. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 52*(8), 853-860.

Scheeringa, M. S., Wright, M. J., Hunt, J. P., & Zeanah, C. H. (2006). Factors affecting the diagnosis and prediction of PTSD symptomatology in children and adolescents. *American Journal of Psychiatry, 163*, 644-651.

Scheeringa, M. S., & Zeanah, C. H. (1995). Symptom expression and trauma variables in children under 48 months of age. *Infant Mental Health Journal, 16*(4), 259-270.

Scheeringa, M. S., & Zeanah, C. H. (2001). A relational perspective on PTSD in early childhood. *Journal of Traumatic Stress, 14*, 799-815.

Scheeringa, M. S., & Zeanah, C. H. (2003). *Coding manual for PTSD Semi-Structured Interview and observational record for infants and young children (0-48 months)*. Unpublished Manuscript.

Scheeringa, M. S., & Zeanah, C. H. (2005). *PTSD semi-structured interview and observational record for infants and young children*, Tulane University Health Sciences Center, New Orleans.

Scheeringa, M. S., Zeanah, C. H., & Cohen, J. A. (2011b). PTSD in children and adolescents: toward an empirically based algorithm. *Depression and Anxiety, 28*(9), 770-782.

Scheeringa, M. S., Zeanah, C. H., Drell, M. J., & Larrieu, J. A. (1995). Two approaches to the diagnosis of posttraumatic stress disorder in infancy and early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*(2), 191-200.

Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2003). New findings on alternative criteria for PTSD in preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*, 561-570.

Scheeringa, M. S., Zeanah, C. H., Myers, L., & Putnam, F. W. (2005). Predictive validity in a prospective follow-up of PTSD in preschool children. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*, 899-906.

Schiestl, C., Beynon, C., & Balmer, B. (2006). What are the differences? Treatment of burns in children compared to treatment in adults. *Osteosynthesis and Trauma Care, 15*(1), 26–28.

Schreier, H., Ladakakos, C., Morabito, D., Chapman, L., & Knudson, M. M. (2005). Posttraumatic stress symptoms in children after mild to moderate pediatric trauma: a longitudinal examination of symptom prevalence, correlates, and parent-child symptom reporting. *The Journal of Trauma, 58*(2), 353-363.

Slaikeu, K. A. (1990). *Crisis Intervention*. Boston: Allyn and Bacon.

Smith, P., Yule, W., Perrin, S., Tranah, T., Dalgleish, T., & Clark, D. M. (2007). Cognitive-behavioral therapy for PTSD in children and adolescents: a preliminary randomized controlled trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 46*(8), 1051-1061.

Stallard, P., & Salter, E. (2003). Psychological debriefing with children and young people following traumatic events. *Clinical Child Psychology and Psychiatry, 8*, 445-458.

Stallard, P., & Smith, E. (2007). Appraisals and cognitive coping styles associated with chronic post-traumatic symptoms in child road traffic accident survivors. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 48*, 194-201.

Stallard, P., Velleman, R., & Baldwin, S. (1999). Psychological screening of children for post-traumatic stress disorder. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 40*, 1075-1082.

Stallard, P., Velleman, R., Langsford, J., & Baldwin, S. (2001). Coping and psychological distress in children involved in road traffic accidents. *British Journal of Clinical Psychology, 40*(2), 197-208.

Stallard, P., Velleman, R., Salter, E., Howse, I., Yule, W., & Taylor, G. (2006). A randomised controlled trial to determine the effectiveness of an early psychological intervention with children involved in road traffic accidents. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 47*(2), 127-134

Steil, R., & Füchsel, G. (2006). *Interviews zu Belastungsstörungen bei Kindern und Jugendlichen (IBS-KJ). [The Clinician-Administered PTSD Scale, Child and Adolescent Version (CAPS-CA)]*. Göttingen: Hogrefe.

Steinhausen, H. C., Winkler Metzke, C., & Kannenberg, R. (1996). *Handbuch: Elternfragebogen über das Verhalten von Kindern und Jugendlichen. Die Zürcher Ergebnisse zur deutschen Fassung der Child Behavior Checklist (CBCL). [Handbook: Parent questionnaire on the behavior of children and adolescents. Zurich's results of the German version of the Child Behavior Checklist (CBCL)]*. Zürich: Psychiatrische Universitäts-Poliklinik für Kinder und Jugendliche.

Stiensmeier, J. (1988). Die Erfassung von Depression bei Kindern: Eine deutsche Version des Children's Depression Inventory (CDI-d). [Assessment of depression in children: A German version of the Children's Depression Inventory (CDI-d)]. *Diagnostica, 34*(4), 320-331.

Stiensmeier-Pelster, J. (2000). *Depressionsinventar für Kinder und Jugendliche (DIKJ). [Depression inventory for children and adolescents (CDI)]*. (Revised and newly normalized 2nd ed.). Göttingen: Hogrefe.

Stiensmeier-Pelster, J. (2011). Depressionsinventar für Kinder und Jugendliche (DIKJ). [Depression inventory for children and adolescents (CDI)]. In C. Barkmann, M. Schulte- Markwort & E. Brähler (Eds.), *Klinisch-psychiatrische Ratingskalen für das Kindes- und Jugendalter* (6 ed., pp. 154-158). Göttingen: Hogrefe.

Stierlin, E. (1909). *Psycho-neuropathology as a Result of a Mining Disaster*, Universität Zürich, Zürich.

Stoddard, F. J., Norman, D. K., & Murphy, J. M. (1989). A diagnostic outcome study of children and adolescents with severe burns. *The Journal of Trauma, 29*, 471-477.

Stoddard, F. J., Saxe, G., Ronfeldt, H., Drake, J. E., Burns, J., Edgren, C., & Sheridan, R. (2006). Acute stress symptoms in young children with burns. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*, 87-93.

Terr, L. C. (1991). Childhood traumas: on outline and overview. *American Journal of Psychiatry, 148*(1), 10-20.

Thomas, C. R., Blakeney, P., Holzer, C. E., & Meyer, W. J. (2009). Psychiatric disorders in long-term adjustment of at-risk adolescent burn survivors. *Journal of Burn Care & Research: Official Publication of the American Burn Association, 30*(3), 458-463.

Trickey, D., Siddaway, A. P., Meiser-Stedman, R., Serpell, L., & Field, A. P. (2012). A meta-analysis of risk factors for post-traumatic stress disorder in children and adolescents. *Clinical Psychology Review, 32*(2), 122-138.

Vickers, A. J. (2005). Analysis of variance is easily misapplied in the analysis of randomized trials: a critique and discussion of alternative statistical approaches. *Psychosomatic Medicine, 67*(4), 652-655.

Wessely, S., Bryant, R. A., Greenberg, N., Earnshaw, M., Sharpley, J., & Hughes, J. H. (2008). Does psychoeducation help prevent post traumatic psychological distress? *Psychiatry, 71*(4), 287-302.

Wethington, H. R., Hahn, R. A., Fuqua-Whitley, D. S., Sipe, T. A., Crosby, A. E., Johnson, R. L., Liberman, A. M., Moscicki, E., Price, L. N., Tuma, F. K., Kalra, G., & Chattopadhyay, S. K. (2008). The effectiveness of interventions to reduce psychological harm from traumatic events among children and adolescents: a systematic review. *American Journal of Preventive Medicine, 35*(3), 287-313.

Wilson, D. B. (Producer). (2005, 2011.08.15). Meta-analysis macros for SAS, SPSS, and Stata. Retrieved from http://mason.gmu.edu/~dwilsonb/ma.html

Winston, F. K., Kassam-Adams, N., Garcia-Espana, F., Ittenbach, R., & Cnaan, A. (2003). Screening for risk of persistent posttraumatic stress in injured children and their parents. *Journal of the American Medical Association, 290*(5), 643-649.

Wood, M. M., Brendtro, L. K., Fecser, F. A., & Nichols, P. (1999). *Psychoeducation: an idea whose time has come*. Virginia: The Council for Exceptional Children.

Yule, W. (1992). Post-traumatic stress disorder in child survivors of shipping disasters: the sinking of the 'Jupiter'. *Psychotherapy and Psychosomatics, 57*(4), 200-205.

Yule, W. (1994). Posttraumatic stress disorder. In M. Rutter, E. Taylor & L. Hersov (Eds.), *Child and Adolescent Psychiatry: Modern Approaches* (3rd ed., pp. 392-406). Oxford: Blackwell Scientific Publications.

Yule, W., & Udwin, O. (1991). Screening child survivors for post-traumatic stress disorder: experiences from the 'Jupiter' sinking. *British Journal of Clinical Psychology, 30*, 131-138.

Zehnder, D., Hornung, R., & Landolt, M. A. (2006). Notfallpsychologische Interventionen im Kindesalter. [Emergency psychology interventions for children after trauma]. *Praxis der Kinderpsychologie und Kinderpsychiatrie, 55*(9), 675-692.

Zehnder, D., Meuli, M., & Landolt, M. A. (2010). Effectiveness of a single-session early psychological intervention for children after road traffic accidents: a randomised controlled trial. *Child and Adolescent Psychiatry and Mental Health, 4*(7), http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=20181120

Ziegler, M. F., Greenwald, M. H., DeGuzman, M. A., & Simon, H. K. (2005). Posttraumatic stress responses in children: awareness and practice among a sample of pediatric emergency care providers. *Pediatrics, 115*, 1261-1267.

APPENDIX

Appendix 1.
Intervention material (burn accident) for 2 to 11 years old children

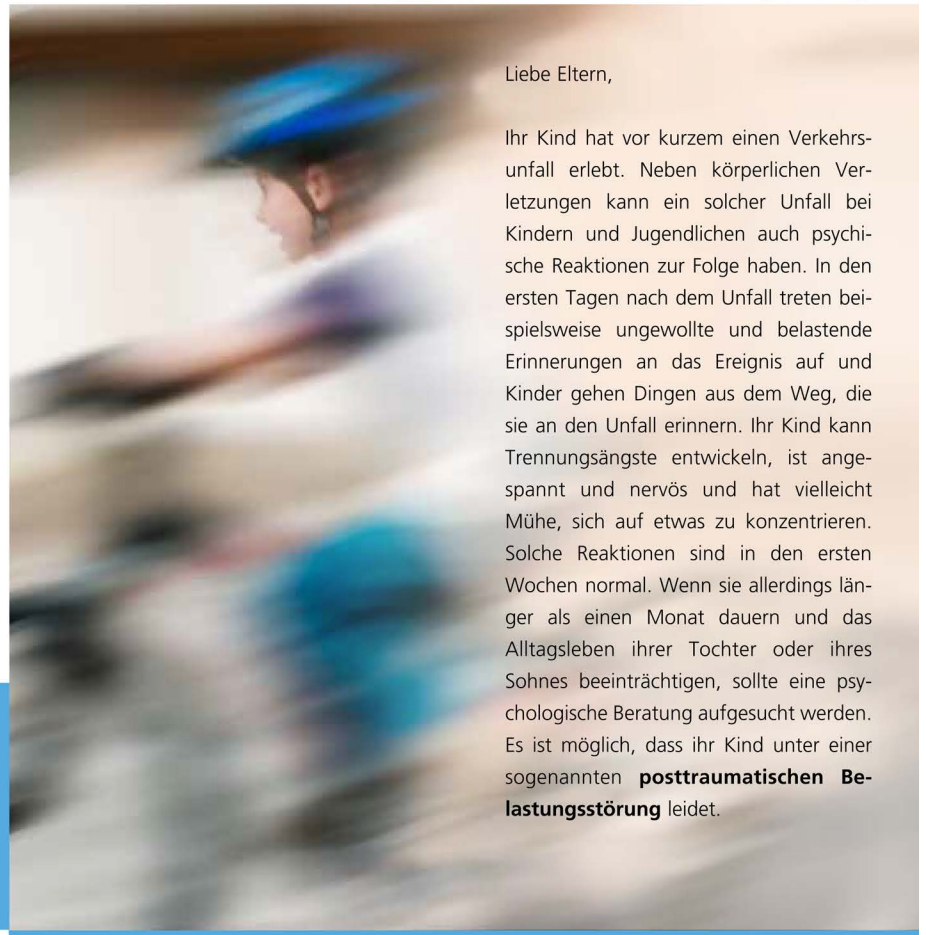
Appendix 2.
Intervention material (road traffic accident) for 2 to 11 years old children

Appendix 3.
Intervention material (burn accident) for 12 to 16 years old children

Appendix 4.
Intervention material (road traffic accident) for 12 to 16 years old children

Appendix 5.
Psycho-educational leaflet for parents and older children (road traffic accident)

Verkehrsunfall
Tipps zur Bewältigung



Liebe Eltern,

Ihr Kind hat vor kurzem einen Verkehrsunfall erlebt. Neben körperlichen Verletzungen kann ein solcher Unfall bei Kindern und Jugendlichen auch psychische Reaktionen zur Folge haben. In den ersten Tagen nach dem Unfall treten beispielsweise ungewollte und belastende Erinnerungen an das Ereignis auf und Kinder gehen Dingen aus dem Weg, die sie an den Unfall erinnern. Ihr Kind kann Trennungsängste entwickeln, ist angespannt und nervös und hat vielleicht Mühe, sich auf etwas zu konzentrieren. Solche Reaktionen sind in den ersten Wochen normal. Wenn sie allerdings länger als einen Monat dauern und das Alltagsleben ihrer Tochter oder ihres Sohnes beeinträchtigen, sollte eine psychologische Beratung aufgesucht werden. Es ist möglich, dass ihr Kind unter einer sogenannten **posttraumatischen Belastungsstörung** leidet.

auch wieder für einige Tage im Elternbett schlafen, wenn sie dies wünschen. Erklären Sie Ihrem Kind, dass die Ängste und die heftigen Erinnerungen an den Unfall normal sind und in absehbarer Zeit abnehmen werden. Geben Sie Ihrem Kind Zeit, die belastenden Erinnerungen zu verarbeiten!

■ **Gewohnte Strukturen beibehalten**
Die Wiederherstellung von Normalität ist nach einem Unfall von grosser Wichtigkeit. Achten Sie deshalb darauf, dass Ihr Kind so schnell wie möglich wieder seinen gewohnten Tagesablauf hat (Essen, Schlafen, Spielen etc.). Gestalten sie den Alltag so normal wie möglich mit Schule bzw. Kindergarten oder Kindertagesstätte, Spielen und Beschäftigung. Informieren Sie die Lehrperson, die Kindergärtnerin oder die Betreuungspersonen Ihres Kindes über den Unfall und die Belastungsreaktionen, die auftreten. Geben Sie diesen Personen allenfalls diese Informationsbroschüre ab.

■ **Beobachten**
Achten Sie in der Zeit nach dem Unfall genau auf allfällige Verhaltensänderungen bei Ihrem Kind. Treten die oben beschriebenen Symptome des Wiedererlebens, des Vermeidungsverhaltens und der körperlichen Übererregung über mehr als 4-6 Wochen auf, ist eine Fachberatung aufzusuchen. Für eine Kontaktadresse können Sie sich an Ihren Kinderarzt oder das Kinderspital wenden.

Wir wünschen Ihrem Kind und Ihnen alles Gute!

Kontakt

Kinderspital Zürich	Telefon Zentrale	044 266 71 11
Universitäts-Kinderkliniken	Telefon lic. phil. D. Kramer	044 266 81 82
Steinwiesstrasse 75	Telefon PD Dr. Landolt	044 266 73 96
CH-8032 Zürich	didier.kramer@kispi.uzh.ch	

Den Kindern alles Gute.

KINDERSPITAL ZÜRICH
Universitäts-Kinderkliniken · Eleonoren-Stiftung

Welches sind die Symptome einer posttraumatischen Belastungsstörung?

Es gibt drei Hauptgruppen von Symptomen, die die posttraumatische Belastungsstörung kennzeichnen:

■ Wiedererleben des Unfalls

Erinnerungen (Bilder, Geräusche, usw.) vom Unfall drängen immer wieder hervor und belasten das Kind. Das kann in Form von Albträumen sein, die nicht unbedingt den Unfall zum Thema haben müssen, sondern vielleicht einfach nur beängstigend sind. Jede Kleinigkeit, die auch nur entfernt an den Unfall erinnert, kann zur Bedrohung für das Kind werden. Es kann auch zu körperlichen Reaktionen kommen, wenn das Kind Situationen ausgesetzt ist, die an den Unfall erinnern. Wenn ihr Kind noch jünger ist, kann es auch vorkommen, dass es den Unfall oder einzelnen Szenen daraus immer und immer wieder nachspielt.

■ Vermeidungsverhalten

Da die Symptome des Wiedererlebens unangenehm und quälend sind, versucht das Kind auslösende Situationen zu vermeiden. Es kann beispielsweise Ängste vor dem Autofahren oder vor dem Überqueren von Strassen entwickeln. Jüngere Kinder wollen vielleicht nicht mehr alleine zur Schule oder in den Kindergarten gehen und entwickeln weitreichende Trennungsängste. Sie können unter Umständen in der ersten Zeit nicht mehr alleine in ihrem Zimmer schlafen oder haben Angst, wenn sie alleine zuhause sind. Möglicherweise ziehen sich Kinder sogar von ihren Freundinnen und Freunden zurück und verlieren das Interesse an Tätigkeiten, die ihnen früher grosse Freude bereitet haben. Bei Jugendlichen sind Vorstellungen über eine beeinträchtigte Zukunft und damit zusammenhängende Ängste häufig.

■ Körperliche Übererregung

Das Wiedererleben des Unfalls und der dauernde Versuch, auslösenden Situationen aus dem Weg zu gehen, führen beim Kind zu einer körperlichen Übererregung und andauernden Anspannung. Es kann an Schlafstörungen, Konzentrationsproblemen und an einer erhöhten Reizbarkeit und Schreckhaftigkeit leiden. Ihr Kind verliert vielleicht rasch die Geduld, weint oft, ist unruhig oder reagiert aggressiv und aufbrausend. Bei sehr jungen Kindern kann sich dies auch in häufigerem Schreien ohne klare Ursache äussern, wobei das Kind schwieriger zu beruhigen ist. Weiter kann es bei dieser Alterskategorie zu meist vorübergehenden Rückschritten in der Sprache (Babysprache, Stottern) oder der Sauberkeitserziehung (Einnässen, Einkoten) kommen. Bei Kindern zwischen vier und sechs Jahren zeigt sich die körperliche Übererregung auch häufig in aggressiven Verhaltensweisen.

Was können Eltern tun, um ihrem Kind bei der Bewältigung des Unfalls zu helfen?

Als Eltern sind sie die nächsten Bezugspersonen ihrer Tochter oder ihres Sohnes und spielen deshalb nach einem Unfall eine wichtige Rolle. Sie können verschiedene Dinge tun, um ihrem Kind zu helfen, die belastende Erfahrung des Unfalls zu bewältigen.

■ Gespräch

Sprechen Sie mit Ihrem Kind offen über den Unfall und ermuntern Sie es, seine Gedanken und Gefühle auszudrücken. Warten Sie nicht, bis ihr Kind von sich aus das Thema anschneidet. Auch mit sehr jungen Kindern kann bereits ein kurzes und einfaches Gespräch über das Geschehene geführt werden. Dies kann auch im Spiel oder in Zeichnungen geschehen. Stellen Sie Ihrem Kind dazu geeignetes und motivierendes Spielmaterial zur Verfügung. Achten Sie darauf, dass ihr Kind eine genaue Vorstellung über den Ablauf des Unfalls hat und versteht, was geschehen ist. Wenn ihr Kind schon im Jugendalter ist, können Sie es ermuntern, seine Erlebnisse mit Freunden und Freundinnen zu besprechen und sich von diesen Unterstützung zu holen.

■ Sicherheit

In den Tagen nach dem Unfall ist es wichtig, dass man zur Ruhe kommt. Versuchen Sie Ihrem durch den Unfall verunsicherten und verängstigten Kind Sicherheit zu vermitteln und es zu beruhigen: Bleiben Sie bei ihm, begleiten Sie es am Anfang in belastenden Situationen. Seien Sie vermehrt für Ihr Kind verfügbar und versuchen Sie, auf die grösseren Geborgenheitsbedürfnisse des Kindes einzugehen. Lassen Sie jüngere Kinder vorübergehend und für eine vereinbarte Zeitdauer ruhig

Appendix 6.
Psycho-educational leaflet for parents and older children (Burn accident)

auch wieder für einige Tage im Elternbett schlafen, wenn sie dies wünschen. Erklären Sie Ihrem Kind, dass die Ängste und die heftigen Erinnerungen an den Unfall normal sind und in absehbarer Zeit abnehmen werden. Geben Sie Ihrem Kind Zeit, die belastenden Erinnerungen zu verarbeiten!

■ **Gewohnte Strukturen beibehalten**
Die Wiederherstellung von Normalität ist nach einem Unfall von grosser Wichtigkeit. Achten Sie deshalb darauf, dass Ihr Kind so schnell wie möglich wieder seinen gewohnten Tagesablauf hat (Essen, Schlafen, Spielen etc.). Gestalten sie den Alltag so normal wie möglich mit Schule bzw. Kindergarten oder Kindertagesstätte, Spielen und Beschäftigung. Informieren Sie die Lehrperson, die Kindergärtnerin oder die Betreuungspersonen Ihres Kindes über den Unfall und die Belastungsreaktionen, die auftreten. Geben Sie diesen Personen allenfalls diese Informationsbroschüre ab.

■ **Beobachten**
Achten Sie in der Zeit nach dem Unfall genau auf allfällige Verhaltensänderungen bei Ihrem Kind. Treten die oben beschriebenen Symptome des Wiedererlebens, des Vermeidungsverhaltens und der körperlichen Übererregung über mehr als 4-6 Wochen auf, ist eine Fachberatung aufzusuchen. Für eine Kontaktadresse können Sie sich an Ihren Kinderarzt oder das Kinderspital wenden.

Wir wünschen Ihrem Kind und Ihnen alles Gute!

Kontakt

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Telefon PD Dr. Landolt 044 266 73 96
didier.kramer@kispi.uzh.ch

Den Kindern alles Gute.

Verbrennungsunfall
Tipps zur Bewältigung

Liebe Eltern,

Ihr Kind hat vor kurzem einen Verbrennungsunfall erlebt. Neben körperlichen Verletzungen kann ein solcher Unfall bei Kindern und Jugendlichen auch psychische Reaktionen zur Folge haben. In den ersten Tagen nach dem Unfall treten beispielsweise ungewollte und belastende Erinnerungen an das Ereignis auf und Kinder gehen Dingen aus dem Weg, die sie an den Unfall erinnern. Ihr Kind kann Trennungsängste entwickeln, ist angespannt und nervös und hat vielleicht Mühe, sich auf etwas zu konzentrieren. Solche Reaktionen sind in den ersten Wochen normal. Wenn sie allerdings länger als einen Monat dauern und das Alltagsleben ihrer Tochter oder ihres Sohnes beeinträchtigen, sollte eine psychologische Beratung aufgesucht werden. Es ist möglich, dass ihr Kind unter einer sogenannten **posttraumatischen Belastungsstörung** leidet.

KINDERSPITAL ZÜRICH
Universitäts-Kinderkliniken · Eleonoren-Stiftung

Welches sind die Symptome einer posttraumatischen Belastungsstörung?

Es gibt drei Hauptgruppen von Symptomen, die die posttraumatische Belastungsstörung kennzeichnen:

■ Wiedererleben des Unfalls

Erinnerungen (Bilder, Geräusche, usw.) vom Unfall drängen immer wieder hervor und belasten das Kind. Das kann in Form von Albträumen sein, die nicht unbedingt den Unfall zum Thema haben müssen, sondern vielleicht einfach nur beängstigend sind. Jede Kleinigkeit, die auch nur entfernt an den Unfall erinnert, kann zur Bedrohung für das Kind werden. Es kann auch zu körperlichen Reaktionen kommen, wenn das Kind Situationen ausgesetzt ist, die an den Unfall erinnern. Wenn ihr Kind noch jünger ist, kann es auch vorkommen, dass es den Unfall oder einzelnen Szenen daraus immer und immer wieder nachspielt.

■ Vermeidungsverhalten

Da die Symptome des Wiedererlebens unangenehm und quälend sind, versucht das Kind auslösende Situationen zu vermeiden. Es kann beispielsweise Ängste vor Feuer, heissen Flüssigkeiten, Feuerwerk etc. entwickeln. Jüngere Kinder wollen vielleicht nicht mehr alleine zur Schule oder in den Kindergarten gehen und entwickeln weitreichende Trennungsängste. Sie können unter Umständen in der ersten Zeit nicht mehr alleine in ihrem Zimmer schlafen oder haben Angst, wenn sie alleine zuhause sind. Möglicherweise ziehen sich Kinder sogar von ihren Freundinnen und Freunden zurück und verlieren das Interesse an Tätigkeiten, die ihnen früher grosse Freude bereitet haben. Bei Jugendlichen sind Vorstellungen über eine beeinträchtigte Zukunft und damit zusammenhängende Ängste häufig.

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■ Gespräch

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■ Sicherheit

In den Tagen nach dem Unfall ist es wichtig, dass man zur Ruhe kommt. Versuchen Sie Ihrem durch den Unfall verunsicherten und verängstigten Kind Sicherheit zu vermitteln und es zu beruhigen: Bleiben Sie bei ihm, begleiten Sie es am Anfang in belastenden Situationen. Seien Sie vermehrt für Ihr Kind verfügbar und versuchen Sie, auf die grösseren Geborgenheitsbedürfnisse des Kindes einzugehen. Lassen Sie jüngere Kinder vorübergehend und für eine vereinbarte Zeitdauer ruhig

Appendix 7.
Illustrations of potential PTSD symptoms after a road traffic accident (from top left to bottom right: accident, intrusions, nightmares/sleep disturbance, social withdraw/diminished interest, problems with concentration, diminished appetite, separation anxiety, increased frequency of negative emotional states)

Appendix 8.
Illustrations of potential PTSD symptoms after a burn accident (from top left to bottom right: accident, intrusions, nightmares/sleep disturbance, social withdraw/diminished interest, problems with concentration, diminished appetite, separation anxiety, increased frequency of negative emotional states)

Appendix 9.
Scoring sheet for study selection

Early Interventions

Systematic review: Scoring sheet for study selection

Rater: ❑ Markus Landolt
❑ Didier Kramer

Number of paper: _____

Inclusion criteria

		yes	no	N/A
1. Age of participants:	≤ 18 years	❑	❑	❑
2. Type of trauma:	Intervention (also) focusses on type I trauma	❑	❑	❑
3. Time point of intervention:	First session ≤ 1 month post trauma[1]	❑	❑	❑
4. Outcome measure:	At least standardized PTSD measure	❑	❑	❑
5. Design:	a) Prospective	❑	❑	❑
	b) Control group	❑	❑	❑
	c) At least one follow up assessment	❑	❑	❑
	d) No case study	❑	❑	❑
6. Language of publication:	English, German	❑	❑	❑
7. Quality of reporting:	a) Description of intervention/type of intervention stated	❑	❑	❑
	b) Sufficient description of methods	❑	❑	❑
8. Analysis:	Basic descriptive statistics	❑	❑	❑
	all inclusion criteria fulfilled?	❑	❑	❑

❑ check exclusion criteria

❑ exclusion

[1] Excepted Web-based interventions

Appendix 9.
Scoring sheet for study selection (continued)

Exclusion criteria

		yes	no	N/A
1. Age or participants:	> 18 years	❑	❑	❑
2. Type of trauma:	Intervention (also) focusses on type II trauma	❑	❑	❑
3. Time point of intervention:	First session > 1 month post trauma[1]	❑	❑	❑
4. Outcome measure:	No standardized PTSD instrument applied	❑	❑	❑
5. Design:	a) Retrospective	❑	❑	❑
	b) No control group	❑	❑	❑
	c) No follow up assessment	❑	❑	❑
	d) Case Study	❑	❑	❑
6. Language of publication:	Other language than English or German	❑	❑	❑
7. Quality of reporting:	a) No description of intervention/ type of intervention not stated	❑	❑	❑
	b) Insufficient description of methods	❑	❑	❑
8. Analysis:	No basic descriptive statistics	❑	❑	❑
	At least 1 exclusion criterion fulfilled?	❑	❑	❑

❑ **exclusion**

❑ **method assessment**

[1] Excepted Web-based interventions

Appendix 10.
Reasons for articles to be excluded

Study	Reason for exclusion
Austin et al., 1999	Review
Bisson et al., 2004	adulthood
Brill et al., 2001	Review
Bronchard et al., 2001	Review
Bryant et al., 1998	adulthood
Bryant et al., 2005	adulthood
Brymer et al., 2009	Review
Caffo & Belaise, 2003	Review
Casswell, 1997	unsatisfactory methodological quality
Catani et al., 2009	Typ II Trauma
Chapman et al., 2001	unsatisfactory methodological quality
Chemtob et al., 2002	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Cohen et al., 2010	Review
Cohen, J., 2003	Review
Espie, 2009	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Foa et al, 2006	adulthood
Fremont, 2004	Review
Galante & Foa, 1986	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Giannopoulou et al., 2006	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Gidron et al., 2001	adulthood
Goenjian et al., 1997	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Grant et al., 1997	No Intervention
Hoagwood, 2007	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Klingmann, 1987	unsatisfactory methodological quality
La Greca & Silverman, 2009	Review
Litz & Maguen, 2007	Review
Math et al , 2008	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Nagao et al., 1995	not in english
Nagao et al., 2001	not in english
Okuno et al, 2001	not in english
Poijula et al., in press	unsatisfactory methodological quality
Poijula et al., 2001b	same sample as included study
Pynoos & Eth, 1986	unsatisfactory methodological quality
Pynoos & Nader, 1988	Review
Rivlin, E., 1988	Review
Roberts et al, 2009	Review
Salcioglu & Basoglu, 2008	no brief early intervention (intervention more than 6 weeks after the event or more than 6 intervention sessions)
Schreier et al., 2005	unsatisfactory methodological quality
Silverman et al., 2008	Review
Stuber et al., 2002	unsatisfactory methodological quality
Vila et al., 1999	unsatisfactory methodological quality
Yule & Udwin, 1991	same sample as included study

Appendix 11.
Adapted quality assessment tool

Adapted Quality Assessment Tool for included Studies

Study No:_____ **Rater: _____**

1. Clearly defined target symptoms for inclusion	❑$_0$ No clear diagnosis or symptom definition ❑$_1$ Not all participants meet target symptom criteria ❑$_2$ All participants meet target symptom criteria
2. Reliable and valid measures of change with good psychometric properties	❑$_0$ Did not use reliable and valid measures ❑$_1$ Measures used inadequate to measure change ❑$_2$ Reliable valid and adequate measures used
3. Assessor reliability	❑$_0$ No training in administration of instruments used in the study ❑$_1$ Training in administration of instruments used in the study ❑$_2$ Training with performance supervision or reliability checks
4. Manualized, replicable, specific treatment	❑$_0$ Treatment was not replicable or specific ❑$_1$ Treatment was partially described but not easily replicable ❑$_2$ Treatment was clearly described and replicable with manual available
5. Treatment adherence	❑$_0$ Treatment fidelity poor ❑$_1$ Treatment fidelity variable or self monitored by therapist only ❑$_2$ Treatment fidelity independently checked and adequate
6. Non-confounded conditions (eg concurrent psychotherapy or Psychopharmacology, violent household etc)	❑$_0$ Not mentioned or most participant exposed to confounds with no control for variables ❑$_1$ Few participants exposed to confounds with no control for variables ❑$_2$ Confounds non-existent or controlled for (eg exclusion, matched assignment)
7. Use of multi-modal measures	❑$_0$ Self-report measures only ❑$_1$ Clinician administered structured interview only ❑$_2$ Clinician administered structured interview plus self report
8. Use of multi informants (i.e.self, parents, teacher)	❑$_0$ No ❑$_1$ Yes
9. Reported level of therapists training	❑$_0$ No qualifications for treating clinicians provided ❑$_1$ Qualifications for treatment group, clinicians provided ❑$_2$ Qualifications for treatment group and comparative group, clinicians provided
10. Use of a control or comparison group (i.e. usual care, waiting list, minimal treatment)	❑$_0$ No control group or no adequate control group (i.e. not by the traumatic event directly affected group) ❑$_1$ Use of unmatched control group ❑$_2$ Use of matched control group (i.e. age, sex)
11. Clear definition of the population/ participant group to receive intervention in terms of exposure, time since exposure, pre-morbid vulnerability factors and other Demographics	❑$_0$ Participant group inadequately described ❑$_1$ Participant group partially described ❑$_2$ Participants clearly described
12. Adequate follow-up period	❑$_0$ Follow-up of less than 3months ❑$_1$ Follow-up of 3-6months ❑$_2$ Follow up period beyond 6 months
13. Record of exclusion criteria and number of refusals reported	❑$_0$ Exclusion criteria and number of refusals not reported ❑$_1$ Exclusion criteria or number of refusals not reported ❑$_2$ Exclusion criteria and number of refusals reported
14. Drop out analysis?	❑$_0$ No ❑$_1$ Yes or not necessary (very few drop outs)
15. Information on comparability and adjustment for differences in analysis	❑$_0$ No information on comparability ❑$_1$ Some information on comparability with appropriate adjustment ❑$_2$ Sufficient comparability information with appropriate adjustment
16. Presentation of results with inclusion of data for re-analysis of main outcomes (eg standard deviations)	❑$_0$ Inadequate presentation ❑$_1$ Adequate ❑$_2$ Comprehensive
17. Power calculation	❑$_0$ None or not reported ❑$_1$ Mentioned without details ❑$_2$ Details of calculation provided

Appendix 11.
Adapted quality assessment tool (continued)

18. Statistical analysis appropriate for sample size (including correction for multiple test where applicable)	❑$_0$ Inadequate ❑$_1$ Adequate ❑$_2$ Appropriate and comprehensive
19. Conclusions justified (eg accurate representation of results, acknowledgement of methodological limitations)	❑$_0$ No ❑$_1$ Partially ❑$_2$ Yes
20. Sample (adequately) randomized?	❑$_0$ No randomization ❑$_1$ Yes, sample randomized, but details of the method of randomization inappropriately reported, with possible bias. ❑$_2$ Yes, sample randomized with fully reported details of adequate method of randomization, with no bias possible.
21. Were outcome assessors blind to treatment condition?	❑$_0$ No ❑$_1$ Partially ❑$_2$ Yes
22. Reporting of loss to follow-up?	❑$_0$ No report of the reason or number of withdrawals ❑$_1$ Partially reported reasons or number of withdrawals ❑$_2$ Fully reported reasons and number of withdrawals.

Appendix 12.
PEDS-ES, adapted version of the Pediatric Emotional Distress Scale by Saylor et al. (1999)

Item		Equal or less often	A little more often	Much more often	Very much more often
1.	Acts whiny	❑$_1$	❑$_2$	❑$_3$	❑$_4$
2.	Wants things right away	❑$_1$	❑$_2$	❑$_3$	❑$_4$
3.	Refuses to sleep alone	❑$_1$	❑$_2$	❑$_3$	❑$_4$
4.	Has trouble going to bed falling asleep	❑$_1$	❑$_2$	❑$_3$	❑$_4$
5.	Has bad dreams	❑$_1$	❑$_2$	❑$_3$	❑$_4$
6.	Seems fearful without good reason	❑$_1$	❑$_2$	❑$_3$	❑$_4$
7.	Seems worried	❑$_1$	❑$_2$	❑$_3$	❑$_4$
8.	Cries without good reason	❑$_1$	❑$_2$	❑$_3$	❑$_4$
9.	Seems sad and withdrawn	❑$_1$	❑$_2$	❑$_3$	❑$_4$
10.	Clings to adults/doesn't want to be alone	❑$_1$	❑$_2$	❑$_3$	❑$_4$
11.	Seems "hyperactive"	❑$_1$	❑$_2$	❑$_3$	❑$_4$
12.	Has temper tantrums	❑$_1$	❑$_2$	❑$_3$	❑$_4$
13.	Gets frustrated too easily	❑$_1$	❑$_2$	❑$_3$	❑$_4$
14.	Complains about aches and pains	❑$_1$	❑$_2$	❑$_3$	❑$_4$
15.	Acts younger than used to for age (i.e., bed-wetting, baby talk, thumb sucking)	❑$_1$	❑$_2$	❑$_3$	❑$_4$
16.	Seems to be easily startled	❑$_1$	❑$_2$	❑$_3$	❑$_4$
17.	Acts aggressive	❑$_1$	❑$_2$	❑$_3$	❑$_4$
18.	Creates games, stories or pictures about _____	❑$_1$	❑$_2$	❑$_3$	❑$_4$
19.	Brings up _____ in conversation	❑$_1$	❑$_2$	❑$_3$	❑$_4$
20.	Avoids talking about _____ even when asked	❑$_1$	❑$_2$	❑$_3$	❑$_4$
21.	Seems fearful of things that are reminders of ____	❑$_1$	❑$_2$	❑$_3$	❑$_4$

Instruction. In the following you are confronted with a series of behaviors which children might show after distressing experiences. Please read each item carefully and mark the box for equal or less often, a little more often, more often or much more often depending on the frequency the respective behavior is shown compared to the time before the accident.

Appendix 13.
Items for the assessment of the additional risk factors

		No	Yes
1.	Within the past year, has your child seen a psychologist or a doctor for behavioral or attention problems?	❑0	❑1

		No	Yes
2.	Is either parent currently in treatment for any of the following problems?		
	a. Serious chronic physical illness	❑0	❑1
	b. Mental disorder (e.g., depression):	❑0	❑1

3. Has one or more of the following events occurred in your family within the past year?

	No	Yes		No effect	Some effect	Moderate effect	Large effect
a. Separation/divorce of parents	❑0	❑1		❑0	❑1	❑2	❑3
b. Death of a family member or close friend	❑0	❑1	If yes, please rate the current effect of the event on your family's life:	❑0	❑1	❑2	❑3
c. Any other experience that has had an impact on your life: _____	❑0	❑1		❑0	❑1	❑2	❑3

		No	Yes		No effect	Some effect	Moderate effect	Large effect
4.	Do you or your partner feel guilty with regard to your child's accident?	❑0	❑1	If yes, please rate the current effect on your life:	❑0	❑1	❑2	❑3
5.	Have you or your spouse had bad dreams or nightmares of the accident and/or distressing thoughts or recollections that appear unintentionally?	❑0	❑1	If yes, please rate the current effect on your life:	❑0	❑1	❑2	❑3

Instruction: For questions 1 and 2, an answer was deemed positive when the response option "yes" was selected; for items 3 to 5, an answer was deemed positive when "yes" was selected and the current effect was rated as "moderate" or "large"

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Accidents or Burns. Oral presentation at the ISTSS 27th Annual Meeting, Baltimore, Maryland, USA, November 3-5, 2011.

Kramer, D. N., & Landolt, M. A. (2012). *Entwicklung und Evaluation einer altersangepassten frühen Intervention für zwei- bis 16-jährige Kinder nach einem Verkehrs- oder Verbrennungsunfall.* Oral presentation at the 14. Jahrestagung der DeGPT - Fortschritte in der Versorgung traumatisierter Menschen: Netzwerke und innovative Behandlungsangebote, Hamburg, Germany, March 8-11, 2012.

Kramer, D. N. (2012). *Notfallpsychologische Interventionen bei Kindern und Jugendlichen.* Workshop held at the 8. Jahreskongress Psychotherapie - Wissenschaft-Praxis, Ruhr-Universität Bochum, Bochum, Germany, October, 20-21, 2012.

Kramer, D. N., & Landolt, M. A. (2012). *Charakteristika und Effektivität früher psychologischer Interventionen für Kinder und Jugendliche nach einem Monotrauma: Eine Meta-Analyse.* Paper presented at the 14. Jahrestagung der DeGPT - Fortschritte in der Versorgung traumatisierter Menschen: Netzwerke und innovative Behandlungsangebote, Hamburg, Germany, March 8-11, 2012.

Kramer, D. N., & Landolt, M. A. (2012). *Effectiveness of the EPICAP stepped early intervention in preschool age children: preliminary results from an RCT.* Oral presentation at the ISTSS 28th Annual Meeting, Los Angeles, Califorina, USA, November 1-3, 2012.

Kramer, D. N. (2013). *PTBS bei Kindern und Jugendlichen: Prävention und Früherkennung.* Workshop held at the Zürcher Hochschule für Angewandte Wissenschaft – Schwerpunkt Psychopathologie des Kindes- und Jugendalters (PPKJ): Fallseminar, Zurich, Switzerland, March 14, 2013.

Landolt, M. A., & **Kramer, D. N.** (2013). *Evaluation of an early risk screener for PTSD in preschool children after unintentional injury.* Paper presented at the ISTSS 29th Annual Meeting, Philadelphia, PA, USA, November 7-9, 2013.

Kramer, D. N. (2013). *Kann man Traumafolgestörungen nach Unfällen verhindern?* Oral presentation at the University Children's Hospital's further education - Interventionsforschung zur Verbesserung der Lebensqualität. Die Resultate der Reachout-II Projekte am Kinderspital Zürich, University Children's Hospital Zurich, Switzerland, November 28, 2013.